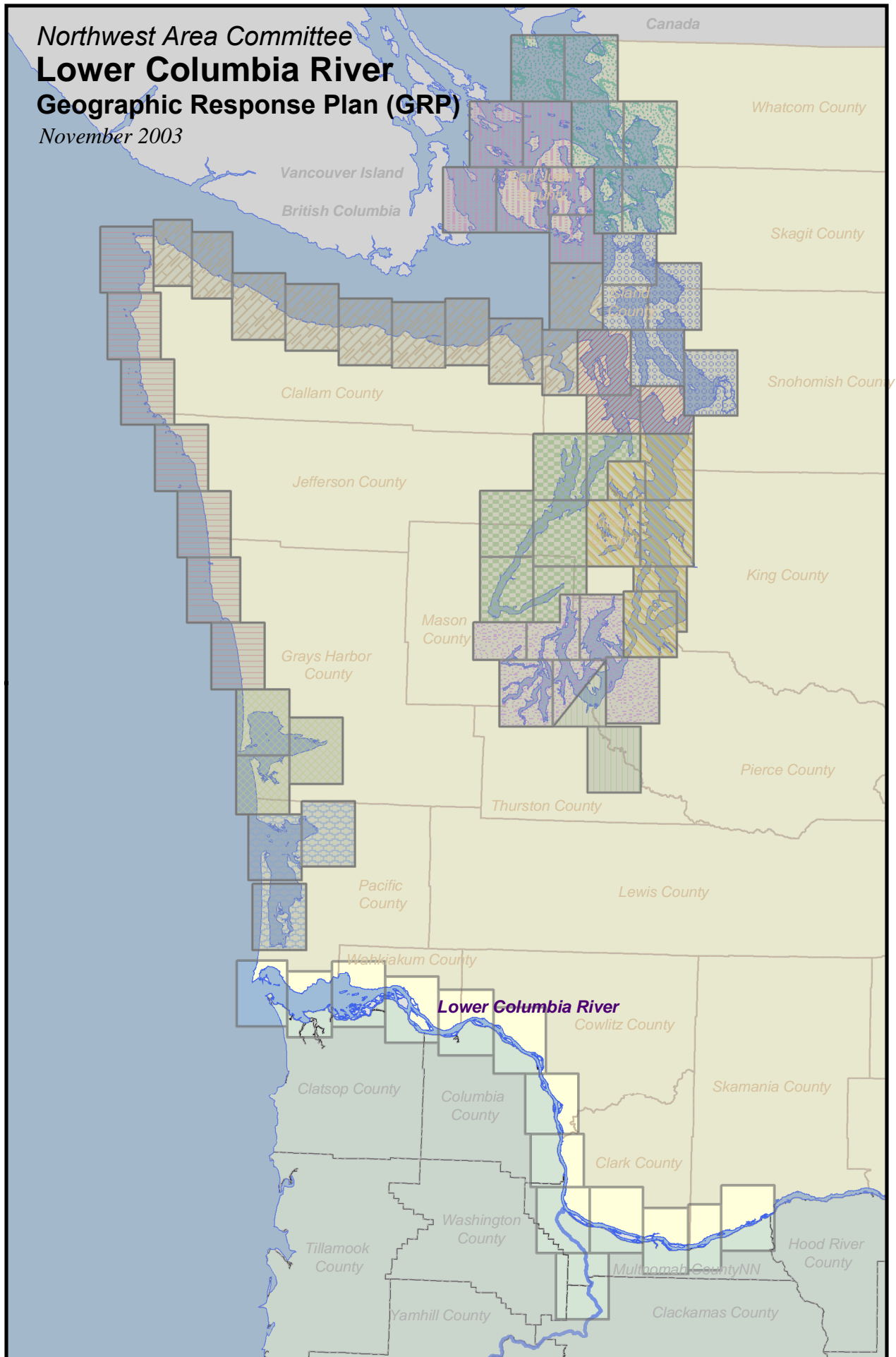


*Northwest Area Committee*  
**Lower Columbia River**  
**Geographic Response Plan (GRP)**

*November 2003*



## SPILL RESPONSE CONTACT SHEET

### Required Notifications For Hazardous Substance or Oil Spills

National Response Center .....(800) 424-8802

**In Oregon:**

Oregon Emergency Response System .....(800) 452-0311

In State .....(800) OILS-911

**In Washington:**

Emergency Management Division.....(800) 258-5990

Department of Ecology Southwest Regional Office.....(360) 407-6300

Department of Ecology Central Regional Office .....(509) 575-2490

### U.S. Coast Guard

National Response Center (800) 424-8802

**Marine Safety Office Puget Sound:**

Watchstander (206) 217-6232

Safety Office (206) 217-6232

**Marine Safety Office Portland:**

Watchstander (503) 240-9301

Safety Office (503) 240-9379

**Pacific Strike Team (415) 883-3311**

**District 13:**

MEP/drat (206) 220-7210

Command Center (206) 220-7001

Public Affairs (206) 220-7237

Vessel Traffic Service (VTS) (206) 217-6050

### Environmental Protection Agency (EPA)

Region 10 Spill Response (206) 553-1263

Washington Ops Office (360) 753-9437

Oregon Ops Office (503) 326-3250

Idaho Ops Office (208) 334-1450

RCRA/ CERCLA Hotline (800) 424-9346

Public Affairs (206) 553-1203

### National Oceanic Atmosphere Administration

Scientific Support Coordination (206) 526-4911

Weather (206) 526-6087

### Department of Interior

Environmental Affairs (503) 231-6157

(503) 621-3682

### Columbia River Inter-Tribal Fish Commission

Portland Office (503) 238-0667

### Cowlitz Tribe

Tribal Office (360) 577-8140

### Chinook Tribe

Tribal Office (360) 777-8303

### Federal O.S.R.O./

#### State Approved Response Contractors

All Out Environmental Services (360) 414-8655

Cowlitz Clean Sweep, Inc. (360) 423-6316

FOSS Environmental (503) 283-1150

Fred Devine (503) 283-5285

Global Diving and Salvage (206) 623-0621

MSRC (800) 259-6772

National Response Corporation (800) 899-4672

Tidewater Environmental (503) 289-4274

### Washington State

Department of Ecology Headquarters (360) 407-6900

Southwest Region (360) 407-6300

Northwest Region (425) 649-7000

Central Region (509) 575-2490

Eastern Region (509) 456-2926

Department of Fish and Wildlife (360) 534-8233

Emergency Management Division (360) 438-8639

(800) 258-5990

### State Patrol

Vancouver (360) 260-6333

### Oregon State

#### Department of Environmental Quality

Headquarters (Portland) (503) 229-5153

Northwest Region (Portland) (503) 229-5263

Eastern Region (Bend) (541) 338-6146

Eastern Region (Pendleton) (541) 278-4063

Western Region (Coos Bay) (541) 269-2721

Western Region (Eugene) (541) 686-7838

Western Region (Medford) (541) 776-6010

Western Region (Salem) (503) 378-8240

Emergency Response System (OERS) (503) 378-6377

(800) 452-0311

(In state) (800) OILS-911

Stop Oregon Litter & Vandalism (503) 647-9855

## HOW TO USE THIS GEOGRAPHIC RESPONSE PLAN

### Purpose of Geographic Response Plan (GRP)

**This plan prioritizes resources to be protected and allows for immediate and proper action. By using this plan, the first responders to a spill can avoid the initial confusion that generally accompanies any spill.**

Geographic Response Plans are used during the emergent phase of a spill which lasts from the time a spill occurs until the Unified Command is operating and/or the spill has been contained and cleaned up. Generally this lasts no more than 24 hours. The GRPs constitute the federal on-scene coordinators' and state on-scene coordinators' (Incident Commanders) "orders" during the emergent phase of the spill. During the project phase, the GRP will continue to be used, and the planned operation for the day will be found in the Incident Action Plan's Assignment List (ICS Form 204). The Assignment List is prepared in the Planning Section with input from natural resource trustees, the Incident Objectives (ICS Form 202), Operations Planning Worksheet (ICS Form 215), and Operations Section Chief.

### Strategy Selection

Chapter 4 contains complete strategy descriptions in matrix form, response priorities, and strategy maps. The strategies depicted in Chapter 4 should be implemented as soon as possible, following the priority table in Section 2 with the "Potential Spill Origin" closest to the actual spill origin. These strategy deployment priorities may be modified by the Incident Commander(s) after reviewing on scene information, including: tides, currents, weather conditions, oil type, initial trajectories, etc.

**It is assumed that control and containment at the source is the number one priority of any response.** If, in the responder's best judgment, this type of response is infeasible then the priorities laid out in Chapter 4, Section 2 take precedence over containment and control.

It is important to note that strategies rely on the spill trajectory. A booming strategy listed as a high priority would not necessarily be implemented if the spill trajectory and booming location did not warrant action in that area. However, the priority tables should be followed until spill trajectory information becomes available, and modifications to the priority tables must be approved by the Incident Commander(s).

The strategies discussed in this GRP have been designed for use with persistent oils and may not be suitable for other petroleum or hazardous substance products. For hazardous substance spills, refer to the Northwest Area Contingency Plan, Chapter 7000.

### Standardized Response Language

In order to avoid confusion in response terminology, this GRP uses standard National Interagency Incident Management System, Incident Command System (NIIMS, ICS) terminology and strategy names, which are defined in Appendix A, Table A-1 (e.g. diversion, containment, exclusion).

## Record of Changes

August 2003

## Table of Contents

<b>Spill Response Contact Sheet .....</b>	<b>i</b>
<b>How To Use This Geographic Response Plan.....</b>	<b>ii</b>
<b>Record of Changes .....</b>	<b>iii</b>
<b>1. Introduction: Scope of this Project.....</b>	<b>1-1</b>
<b>2. Site Description</b>	
2.1 Physical Features.....	2-1
2.2 Hydrology .....	2-2
2.3 Currents and Tides .....	2-2
2.4 Winds .....	2-3
2.5 Climate .....	2-4
2.6 Risk Assessment .....	2-4
<b>3. Reference Maps</b>	
Lower Columbia River Booming Strategy Key Maps.....	3-1
<b>4. General Protection/Collection Strategies</b>	
4.1 Chapter Overview .....	4-1
4.2 Booming Strategy Priority Tables.....	4-2
4.3.1 Proposed Booming and Collection Strategies: Maps.....	4-6
4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices.....	4-20
4.3.2.2 Multnomah Channel Proposed Booming and Collection Strategies: Matrices.....	4-48
4.3.2.3 Willamette River Proposed Booming and Collection Strategies: Matrices .....	4-49
<b>5. Shoreline Information</b>	
5.1 Shoreline Types and Sensitivity.....	5-1
5.2 Shoreline Type Maps .....	5-2
5.3 Oil Countermeasure Matrix.....	5-16
<b>6. Sensitive Resource Description</b>	
6.1 Chapter Overview .....	6-1
6.2 Fish.....	6-1
6.3 Wildlife .....	6-1
6.4 Flight Restriction Zones .....	6-2
6.5 Hazing .....	6-2
6.6 Flight Restriction Zones/ Sensitive Wildlife: Maps & Matrices .....	6-4
6.7 Downstream Water Users .....	6-58
<b>7. Logistical Information</b>	
7.1 Logistical Support.....	7-1
<b>Appendices</b>	
Appendix A: Summary of Protection Techniques .....	A-1
Appendix B: Geographic Response Plan Contributors .....	B-1
Appendix C: Geographic Response Plan Comments/Corrections/Suggestions.....	C-1

## Lower Columbia River, Oregon/Washington

### GEOGRAPHIC RESPONSE PLAN

#### 1. INTRODUCTION: SCOPE OF THIS PROJECT

Geographic Response Plans are intended to help the first responders to a spill avoid the initial confusion that generally accompanies any spill. This document serves as the federal and state on-scene-coordinators “orders” during a spill in the area covered by this GRP (see Chapter 3 for area covered). As such, it has been approved by the U.S. Coast Guard Marine Safety Office and the Washington State Department of Ecology Spills Program. Changes to this document are expected as more testing is conducted through drills, site visits, and actual use in spill situations. To submit comments, corrections, or suggestions please refer to Appendix C.

GRPs have been developed for the marine and inland waters of Washington, Oregon, and Idaho. They are prepared through the efforts and cooperation of the Washington Department of Ecology, Washington Department of Fish and Wildlife, Oregon Department of Environmental Quality, Idaho State Emergency Response Commission, the U.S. Coast Guard, the Environmental Protection Agency, tribes, other state and federal agencies, response organizations, and local emergency responders.

GRPs were developed through workshops involving federal, state, and local oil spill emergency response experts, response contractors, and representatives from tribes, industry, ports, environmental organizations, and pilots. Workshop participants identified resources which require protection, developed operational strategies, and pinpointed logistical support. A similar process has been used for major updates.

Following the workshops, the data gathered was processed and reproduced in the form of maps and matrices which appear in Chapters 4 through 6. The maps in Chapters 5 and 6 were generated using Canvas. Maps for Chapter 4 were generated using ArcView GIS. The matrices were created using MS Excel, and the balance of each GRP was produced using MS Word.

The first goal of a GRP was to identify, with the assistance of the Washington State Natural Resource Damage Assessment Team, resources needing protection; response resources (boom, boat ramps, vessels, etc.) needed, site access and staging, tribal and local response community contacts, and local conditions (e.g. physical features, hydrology, currents and tides, winds and climate) that may affect response strategies. Note that GRPs only address protection of sensitive **public** resources. It is the responsibility of private resource owners and/or potentially liable parties to address protection of private resources (such as commercial marinas, private water intakes, and non-release aquaculture facilities).

Secondly, response strategies were developed based on the sensitive resources noted, hydrology, and climatic considerations. Individual response strategies identify the amount of boom necessary for implementation. The response strategies are then applied to Potential Spill Origins and trajectory modeling, and prioritized, taking into account factors such as resource sensitivity, feasibility, wind, and tidal conditions.

Draft strategy maps and matrices were sent out for review and consideration of strategy viability. Field verification was conducted for some strategies, and changes proposed by the participants were included in a semi-final draft, which was offered for final review to all interested parties and the participants of the field verification.

Finally, the general text of the GRP was compiled along with the site description, reference maps, and logistical support.

Items included in Logistical Support:

- Location of operations center for the central response organization;
- Local equipment and trained personnel;
- Local facilities and services and appropriate contacts for each;
- Site access & contacts;
- Staging areas;
- Helicopter and air support;
- Local experts;
- Volunteer organizations;
- Potential wildlife rehabilitation centers;
- Marinas, docks, piers, and boat ramps;
- Potential interim storage locations, permitting process;
- Damaged vessel safehavens;
- Vessel repairs & cleaning;
- Response times for bringing equipment in from other areas.

## 2. SITE DESCRIPTION

The Lower Columbia River addressed in this GRP includes that lower portion of the Columbia River from Bonneville Dam to the estuary at the mouth of the river, a distance of approximately 145 miles, and the lower Willamette River from Willamette Falls to the confluence with the Columbia, a distance of approximately 26 miles. The lower portion of the 1,210 mile long Columbia River contains an extensive variety of fish, wildlife, and habitat. For this reason, compounded by industry use along its shorelines, larger vessels and increased vessel traffic, this area is highly vulnerable to environmental damage by oil or hazardous materials spills.

Terrain varies from sandy beaches to intermittent rocky areas of rip-rap and intertidal zones with steep cliffs that have limited or no access. The varied stretches of sandy beach represent areas of significant human use. Portions of the riverbank are steep, completely inaccessible rocky cliffs. Other areas are rocky intertidal to cobble type beaches. There are many mid-stream rocks and sand islands that provide bird rookeries and marine mammal haulouts. Interspersed along both the Columbia and Willamette rivers are many small freshwater drainages.

### 2.2. Physical Features

Use of the Columbia River and lower Willamette River waterways throughout the year by many species of wildlife in a variety of stages of development, at locations scattered all along the lower length of the river is well documented. As a result there are 11 major wildlife refuges and state parks located between the Portland/Vancouver area and the Pacific Ocean.

The outflow of the Columbia River forms a vast estuary. This estuary is a meeting point between saltwater and fresh water and the surrounding land. The resulting fragile environment is characterized by highly variable physical, chemical, and biological conditions, allowing organisms from saltwater and fresh water and land to proliferate with great abundance and diversity. Components of this estuary include tidelands, salt marshes, sand spits, uplands, and river channels, all of which interact to create a highly productive habitat.

This GRP addresses the lower 145 miles of the Columbia River and the lower 26 miles of the Willamette River. In addition to the miles of sandy beaches and its sensitive estuary, the Columbia River has its flow augmented by the confluence of the flows from the following creeks and rivers:

**Hamilton Creek** - Hamilton Creek lies approximately 142 miles east of the Columbia River mouth.

**Sandy River** - Sandy River lies approximately 121 miles east of the Columbia River mouth.

**Washougal River** - Washougal River lies approximately 121 miles east of the Columbia River mouth.

**Willamette River** - Willamette River lies approximately 102 miles east of the Columbia River mouth.

**Lake River** - Lake River lies approximately 88 miles east of the Columbia River mouth.

**Lewis River** - Lewis River lies approximately 85.5 miles east of the Columbia River mouth.

**Kalama River** - Kalama River lies approximately 73 miles east of the Columbia River mouth.



**Cowlitz River** - Cowlitz River lies approximately 68 miles east of the Columbia River mouth.

**Mill/Germany/Abernathy Creeks** - Mill/Germany/Abernathy Creeks lie approximately 55 miles east of the Columbia River mouth.

**Clatskanie River** - Clatskanie River lies approximately 50 miles east of the Columbia River mouth.

**Elochoman River** - Elochoman River lies approximately 41 miles east of the Columbia River mouth.

**Skamokawa Creek** - Skamokawa Creek lies approximately 33 miles east of the Columbia River mouth.

**Big Creek** - Big Creek lies approximately 28 miles east of the Columbia River mouth.

**Crooked Creek** - Crooked Creek lies approximately 23 miles east of the Columbia River mouth in Grays Bay.

**Grays River** - Grays River lies approximately 22.5 miles east of the Columbia River mouth in Grays Bay.

**Deep River** - Deep River lies approximately 21 miles east of the Columbia River mouth in Grays Bay.

**John Day River** - John Day River lies approximately 18 miles east of the Columbia River mouth.

**Youngs River** - Youngs River lies approximately 13.5 miles east of the Columbia River mouth in Youngs Bay.

**Lewis & Clark River** - Lewis & Clark River lies approximately 13 miles east of the Columbia River mouth in Youngs Bay.

**Chinook River** - Chinook River lies approximately 5 miles east of the Columbia River mouth in Baker Bay.

**Wollacut River** - Wollacut River lies approximately 4 miles east of the Columbia River mouth in Baker Bay.

Significant tributaries to the Willamette River include:

**Clackamas River** – Clackamas River lies approximately 25 miles south of the Willamette River mouth.

**Oswego Creek** – Oswego Creek lies approximately 21 miles south of the Willamette River mouth.

**Johnson Creek** – Johnson Creek lies approximately 19 miles south of the Willamette River mouth.

**Kellogg Creek** – Kellogg Creek lies approximately 19 miles south of the Willamette River mouth.

This additional water volume, along with the natural water disturbances created by the variances of the riverbank and current flow, create numerous rips, back eddies, and still waters. These will cause the spilled oil to concentrate at various points along the rivers. The oil will also tend to strand and ground at the high water line on a falling tide and on the outside of bends.

### 2.3. Hydrology

Because of the density differences between the fresh water flowing downriver and the salt water driven upriver by tidal forces, a two-layered system or “tidal wedge” develops in the Columbia River, where the surface current moves downstream and the bottom, saltier water moves upstream. This wedge can be apparent as far upriver as Tongue Point (rm 18) and is usually associated with a turbidity maximum.

### 2.4. Currents and Tides

Water levels and velocities in the Lower Columbia River are a function of several factors: seasonal runoff, tidal effects, and the volume of water released by upstream dams. Information from several sources have been included in an effort to give a general view of the river conditions.

Tides: The tides of the Pacific Northwest are semidiurnal - meaning there are two high waters and two low waters each tidal day. Tidal effects on the Columbia River can be felt during low river flow up to Warrendale, Oregon (approximately River Mile 141). Data for stations above Harrington Point apply only during low river stages. The tidal range for the Columbia River is greatest near the mouth, with the tidal influence decreasing upriver. The mean tidal range (MHW-MLW) at Astoria is 6.6 feet and the diurnal range (MHHW-MLLW) is 8.4 feet. The mean tidal range at Warrendale, Oregon is 0.4 feet and the diurnal range is 0.6 feet.<sup>1</sup>

Currents: The tidal current in the Columbia River is always modified by the river discharge, sometimes to the extent that the flood current is indiscernible and the current ebbs continuously. The lower Columbia River is subject to annual freshets (flooding) in the late fall and early winter when rains are the heaviest. Short range predictions on river flow are available from the NOAA Weather Service Northwest River Forecast Center in Portland, Oregon.

Multnomah Channel Effect: The Multnomah Channel runs from the Willamette River to the Columbia River on the southwest side of Sauvie Island. During the spring and early summer when flow rates down the Columbia River are high, the water level of the Columbia River may be higher than the water level in the Willamette River at their confluence. When this occurs, part of the Columbia River will actually flow up the Willamette River until it reaches the Multnomah Channel. At this point, the combined flow of both rivers will be directed downstream through Multnomah Channel until it converges again with the main stream of the Columbia River.

Oil spilled in the Willamette River or on the Columbia upriver from the Willamette confluence will flow down the Multnomah Channel. At the Willamette River/Multnomah Channel confluence, the converging currents create a slack water which tends to disperse the pollutants to both sides of the Willamette River.

The average surface water velocity for the lower Columbia River at Vancouver is 1 - 1.5 knots downstream. Surface water velocity in the lower Columbia at low summer/fall flow is 0.5 knots upstream on an incoming high tide, and 1.0 knots downstream on an outgoing low tide.

The average surface water velocity for the Willamette River at Portland is 0.5 knots downstream. Surface water velocity in the Willamette River at low summer/fall flow is 0.3 knots upstream on an incoming high tide, and 0.5 knots downstream on an outgoing low tide.<sup>2,3</sup>

---

<sup>1</sup> National Oceanic and Atmospheric Administration, 1995. Tide Tables West Coast of North & South America.

<sup>2</sup> National Oceanic and Atmospheric Administration, 1995. Tide Tables Pacific Coast of North & South America.

<sup>3</sup> Columbia River Pilots Assn. March 9, 1995. Presentation at Columbia River Oil Transfer Location Workshop.

## **2.5. Winds**

The northern coast can be affected by strong winds, at times in excess of 100 miles per hour. These winds typically come from the north to northwest in the summer and the southeast to east in the winter. During the summer, the predominant wind direction is from the northwest with speeds ranging from 10 to 15 knots. However maximum peak wind gusts range from 30 to 40 knots. The mean wave heights are about 4.9 feet with maximum heights of 14.7 feet. In the winter, the winds are primarily from the east to southeast at 10 to 15 knots with maximum peak wind gusts ranging from about 55 to 65 knots. Average wave heights are 4.9 feet with maximum wave heights of 32.8 feet. In particular, the coastal mountain range deflects winds so that they tend to flow parallel to the coastline. In areas with lower mountains, this effect may not be as prominent. Winds in Astoria and Portland have an annual mean velocity of 8 knots with directions varying throughout the year.

## **2.6. Climate**

The entire coast is characterized by a maritime climate with cool summers and mild winters. Air temperatures are in the mid 40's in the winter and the low 60's in the summer. Water temperatures are fairly constant, normally in the low 50's. Annual rainfall varies between Astoria and Portland. Astoria averages 66.34" per year and Portland averages 37.61" per year.

## **2.7. Risk Assessment**

### ***VESSELS***

The primary transportation patterns for the Trans-Alaskan Pipeline Trade that affect the Oregon Coast are between Prince William Sound and Richmond, California. The routes for major shipping traffic keep the super tankers 50-60 NM off shore. This distance is believed to minimize coastal effects from a catastrophic spill.

Refined product in barges and small tankers is transported closer to the shoreline and up the Columbia River as far as Pasco, Washington. There are on the average, 160 tank barge movements as well as 50-60 bunkering operations by barge to a variety of vessels per month. The majority of these bunker barges have a capacity of 15,000 bbls.

Annually, self propelled tankers make approximately 100 port calls to the Portland area. The majority of the tank vessels are approximately 39,000 dwt tonnage, having capacity of approximately 275,000 bbls, although the largest have a capacity of 400,000 bbls. Supertankers in ballast also transit the river enroute the Portland Ship yard for routine inspections and maintenance. Approximately 2,000 general cargo, bulk, and container vessels enter the river annually, carrying bunker fuels of approximately 15,000 barrels capacity.

The largest spill in Columbia River history occurred in 1984 when the T/V Mobiloil ran aground on Warrior Rock near the north end of Sauvie Island. This grounding allowed for the spewing of 200,000 gallons of refined oil to the surrounding area. The 1979 *Oil Spill Protection Plan for the Natural Resources of the Lower Columbia and Willamette Rivers* published by DEQ was implemented and cleanup ensued. There was still not an abundance of cleanup equipment positioned along the river at this time, so response was hampered.

More recently this river system has fallen prey to a series of bunkering and cargo transfer related spills, the largest of which was the 11,000 gallon discharge of Intermediate Fuel Oil (IFO) 380 from the M/V Tai Chung at the Columbia Aluminum Facility along the Willamette River (RM 10) just upstream of Swan Island in December of 1991. The product was a thick, viscous oil with high persistency on the affected shoreline. Two similar bunkering mishaps occurred within six months of each other at Longview Anchorage (RM 65).

The M/V Central spewed approximately 3,000 gallons of IFO 180 on the morning of June 3, 1993, when the fill valve to tank 5 starboard was not fully closed. This allowed fuel to continue entering the tank unknown to the vessel's crew, until it flowed from the tanks on deck vent and over the side. High river discharge kept the majority of oil in the main navigational channel and flushed it downriver.

Six months later, on January 10, 1994, the M/V An Ping 6 replayed the events of M/V Central and spilled a similar amount of product at the same location. River discharge was 1/3 the volume of the earlier incident, and portions of the Washington shoreline were badly impacted. Heaviest oiling was found in and around Fisher Island, and cleanup lasted a full 30 days. Response mechanisms were in place by this time and boom and skimmers were deployed as part of the Maritime Fire and Safety Association's Vessel Umbrella Contingency Plan.

A series of other bunker and transfer related spills have plagued the Columbia River, usually with a lighter, less persistent product. Routine training by the covered facilities, the Clean Rivers Cooperative, Maritime Fire and Safety Association, and various contractors helps ensure discharges will be efficiently contained and recovered.

### ***FACILITIES***

Both the Columbia and Willamette Rivers are home to many oil facilities. Very little crude oil is transported to these facilities, with the majority being refined products heading to the large tank farms along the lower Willamette. Over half the oil transported to the region daily comes through pipeline, which crosses the river at various locations.

Of the approximately 30 facilities in this region, the smallest have 1 surface tank with a volume of 10,000 bbls whereas the largest facilities have as many as 100 surface tanks with a capacity of 1.8 million bbls. Many of these tanks are kept within unlined, earthen secondary containment berms capable of holding 100% of the tank contents. These facilities may be vulnerable to natural disasters, equipment failures, and other catastrophes that could lead to a partial or complete loss of tank contents. As a result of recent state and federal legislation, most facilities maintain several thousand feet of harbor and sorbent boom and a means of deployment on site.

With a river current in excess of one knot and sometimes 2 - 3 knots, the time frame in which to respond to contain and/or divert moving oil is very short. History has shown that oil can move from the Port of Vancouver area to the mouth of the Columbia River in less than three days. Boom identified in planning workshops require 54,400 feet of boom to implement all the response strategies.

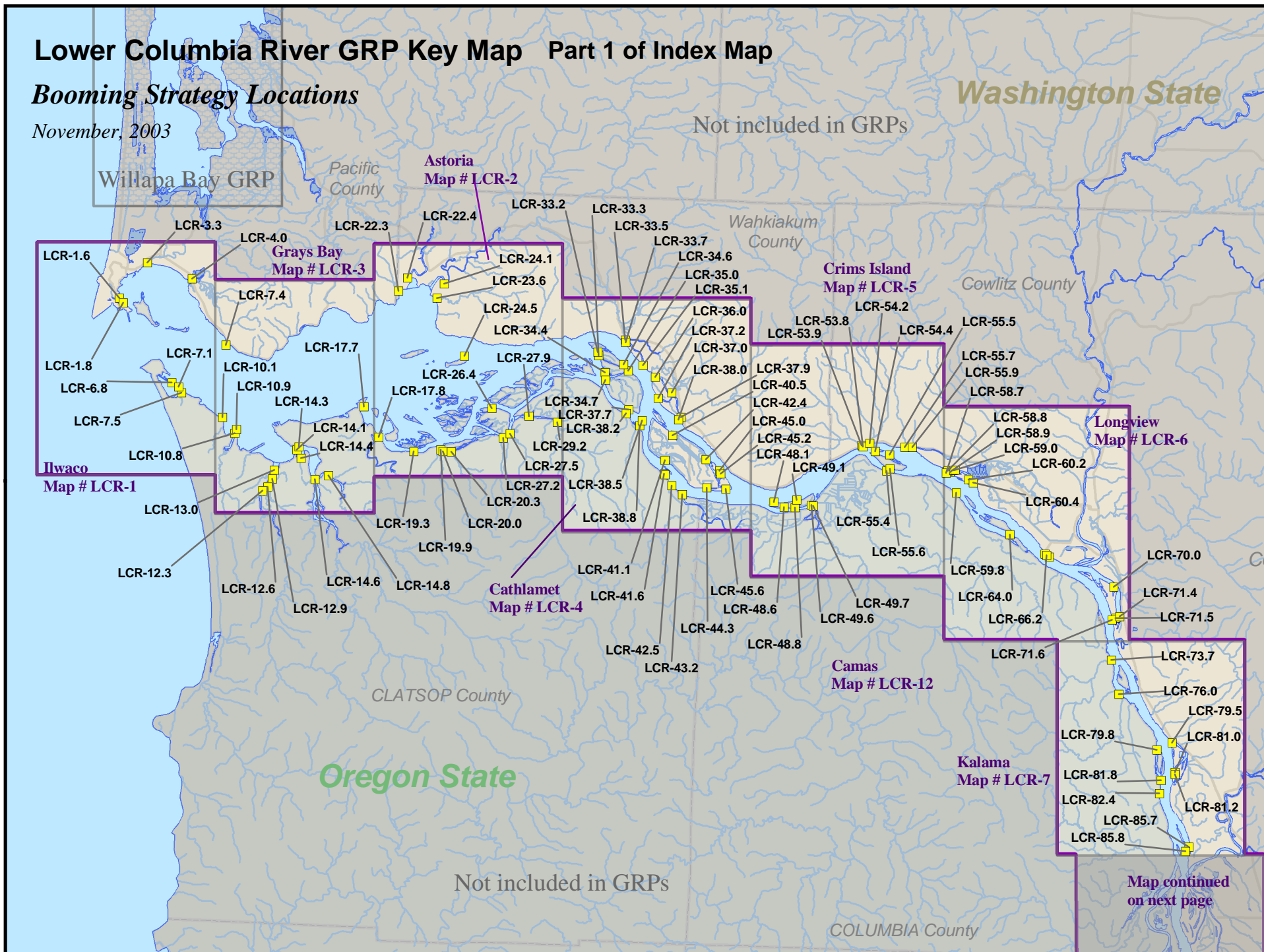
# Lower Columbia River GRP Key Map Part 1 of Index Map

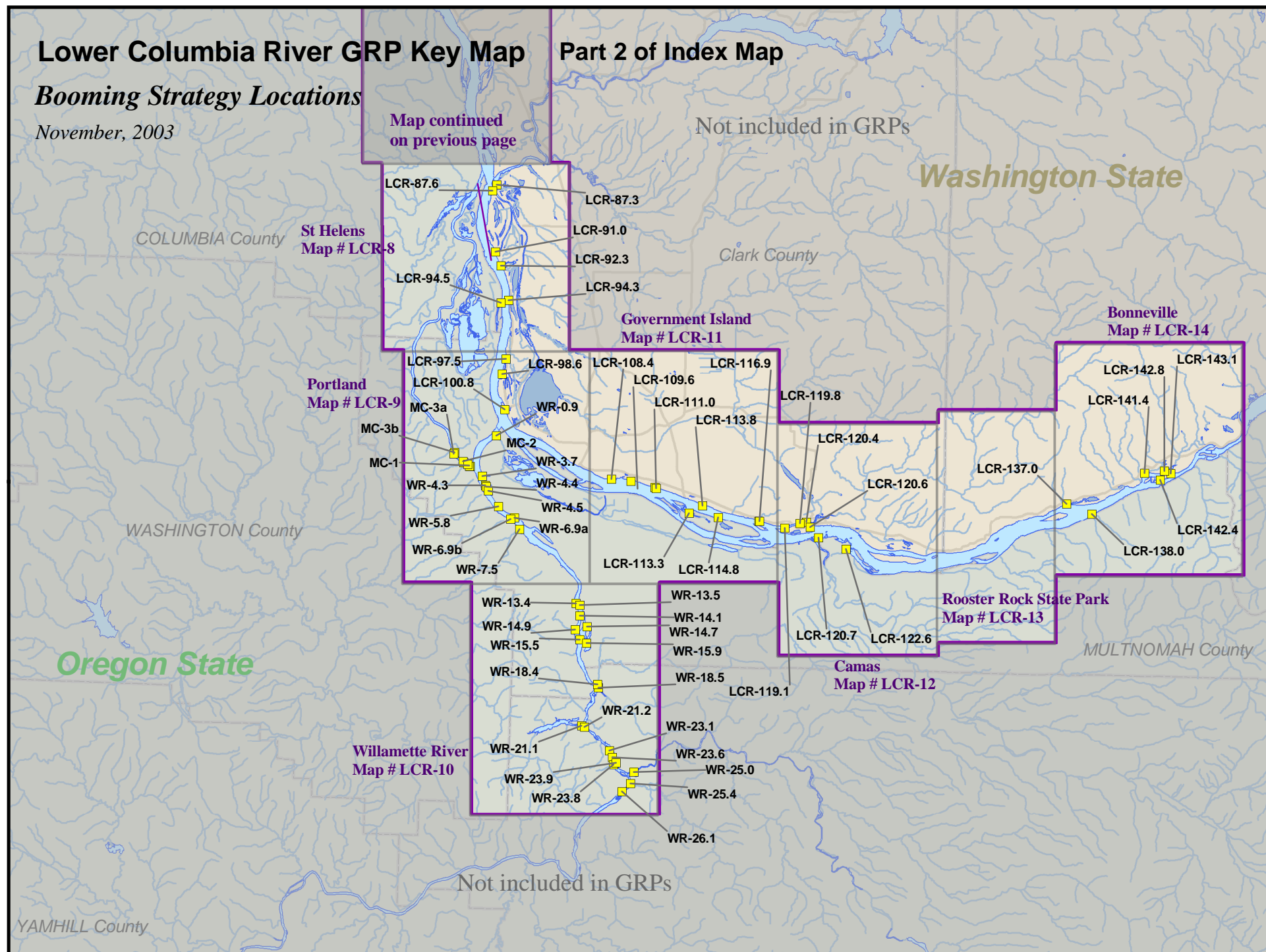
## Booming Strategy Locations

November, 2003

Washington State

Not included in GRPs







## 4. GENERAL PROTECTION/COLLECTION STRATEGIES

### 4.1. Chapter Overview

This chapter details the specific response strategies and resources to protect as outlined by the participants of the GRP workshop for the Central Puget Sound area. It describes the strategies determined for each area and the prioritization of those strategies. Note that GRPs only address protection of sensitive **public** resources. It is the responsibility of private resource owners and/or potentially liable parties to address protection of private resources (such as commercial marinas, private water intakes, and non-release aquaculture facilities).

#### Maps & Matrices

The maps in this chapter provide information on the specific location of booming strategies. They are designed to help the responder visualize response strategies. Details of each booming strategy are listed in corresponding matrix tables. Strategies are numbered based on river mile. River miles are calculated at the center of the shipping channel, so strategies were numbered by drawing a perpendicular line from the strategy position to the center of the shipping channel. Each matrix indicates the exact location, intent and implementation of the strategy indicated on the map. The “Status” column describes whether the strategy has been visited or tested in the field, and the date of the visit/test. Strategies in the estuary on the Washington side include a number for the corresponding shoreline photo, which is available on the Washington Department of Ecology's internet site at <http://www.ecy.wa.gov/apps/shorephotos/>.

#### Major Protection Techniques

All response strategies fall into one of three major techniques that may be utilized either individually or in combination. The strategies listed in Section 4.2 are based on the following techniques, and are explained in detail in Section 4.3:

**Dispersants:** Washington State Policy currently does not allow use of dispersants in this area. Certain chemicals break up slicks on the water. Dispersants can decrease the severity of a spill by speeding the dissipation of certain oil types. Their use will require approval of the Unified Command. Dispersants will only be used in offshore situations under certain conditions, until further determinations are made by the Area Committee and published in the Area Contingency Plan.

**In Situ Burning:** Approval to burn in this area is unlikely due to the proximity of population to a potential burn site. Burning requires the authorization of the Unified Command, who determine conformance of a request to burn with the guidelines set forth in the Area Plan. This option is preferable to allowing a slick to reach the shore provided that population areas are not exposed to excessive smoke. Under the right atmospheric conditions, a burn can be safely conducted in relative close proximity to human population. This method works on many types of oil, and requires special equipment including a fire boom and igniters.

**Mechanical Recovery and Protection Strategies:** If a spill is too close to shore to use In Situ burning or dispersants, the key strategies are skimming and use of collection, diversion, or exclusion booming to contain and recover the oil, and prevent it from entering areas with sensitive wildlife and fisheries resources. These options are described in detail in Appendix A. Specific skimming strategies are not listed in the maps and matrices, but skimming should be used whenever possible and is often the primary means of recovering oil and protecting resources, especially when booming is not possible or feasible.

## 4.2 Booming Strategy Priority Tables

Strategy priorities were developed for each map page in the GRP. For each page-related table, it was assumed that the spill was moving downstream, starting at the upstream end of the map page segment. For spills occurring within a map page, only the strategies downstream of the spill should be deployed. Attempt to determine where the oil is using real-time observations, and begin strategy deployments ahead of the oil. The priority tables were generated based on the assumption that the oil is primarily “current driven” versus “wind driven”.

Elements taken into account in developing the priority tables included the following:

- Relative natural resource values of areas
- Relative amount of natural resource protection afforded by a given strategy
- Special protection status of certain areas (e.g., USFWS refuge)
- Whether a given strategy was the primary means of protecting an area or a secondary strategy
- Perceived likelihood of a given area being oiled, based on experience with past spills
- Perceived likelihood of a given strategy being able to provide the resource protection for which it was intended (e.g., exclusion versus deflection)

The booming strategies indicated in the priority tables are explained in detail in the Maps & Matrices section (Section 4.3.). It is implied that control and containment at the source is the number one priority of any response. If in the responder’s best judgment this is not feasible, then the priorities laid out in the priority tables take precedence over containment and control.



**4.2.1 Lower Columbia River Priority Tables**

<b>Map # 1 - Ilwaco</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-7.1
2	LCR-6.8
3	LCR-7.5
4	LCR-4.0
5	LCR-3.3
6	LCR-1.8
7	LCR-1.6

<b>Map # 2 - Astoria</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-17.7
2	LCR-14.1
3	LCR-13.0
4	LCR-10.8
5	LCR-14.6
6	LCR-14.8
7	LCR-14.3
8	LCR-12.9
9	LCR-12.6
10	LCR-12.3

<b>Map # 3 – Grays Bay</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-26.4
2	LCR-24.1
3	LCR-22.4
4	LCR-22.3
5	LCR-23.6
6	LCR-17.8
7	LCR-27.5
8	LCR-27.2
9	LCR-20.3
10	LCR-20.0
11	LCR-19.9
12	LCR-19.3

<b>Map # 4 - Cathlamet</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-37.9
2	LCR-37.2
3	LCR-36.0
4	LCR-35.0
5	LCR-34.6
6	LCR-34.7
7	LCR-34.4
8	LCR-33.3
9	LCR-32.2
10	LCR-38.8
11	LCR-38.5

<b>Map # 5 – Crims Island</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-55.5
2	LCR-54.4
3	LCR-55.9
4	LCR-55.7
5	LCR-54.2
6	LCR-53.9
7	LCR-49.1
8	LCR-48.1
9	LCR-55.6
10	LCR-55.4
11	LCR-48.8
12	LCR-48.6
13	LCR-49.4

<b>Map # 6 – Longview</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-64.0
2	LCR-71.4
3	LCR-70.0
4	LCR-58.7
5	LCR-58.9
6	LCR-60.2

#### 4.2.1 Lower Columbia River Priority Tables

<b>Map # 7 – Kalama</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-81.2
2	LCR-81.0
3	LCR-81.8
4	LCR-82.4
5	LCR-79.5
6	LCR-79.8
7	LCR-76.0
8	LCR-73.7

<b>Map # 8 – St. Helens</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-94.3
2	LCR-92.3
3	LCR-91.0
4	LCR-87.6
5	LCR-94.5
6	LCR-87.3

<b>Map # 9 – Portland</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-100.8
2	LCR-98.6
3	LCR-97.5
4	WR-0.9

<b>Map # 11 – Government Island</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-114.8
2	LCR-113.3

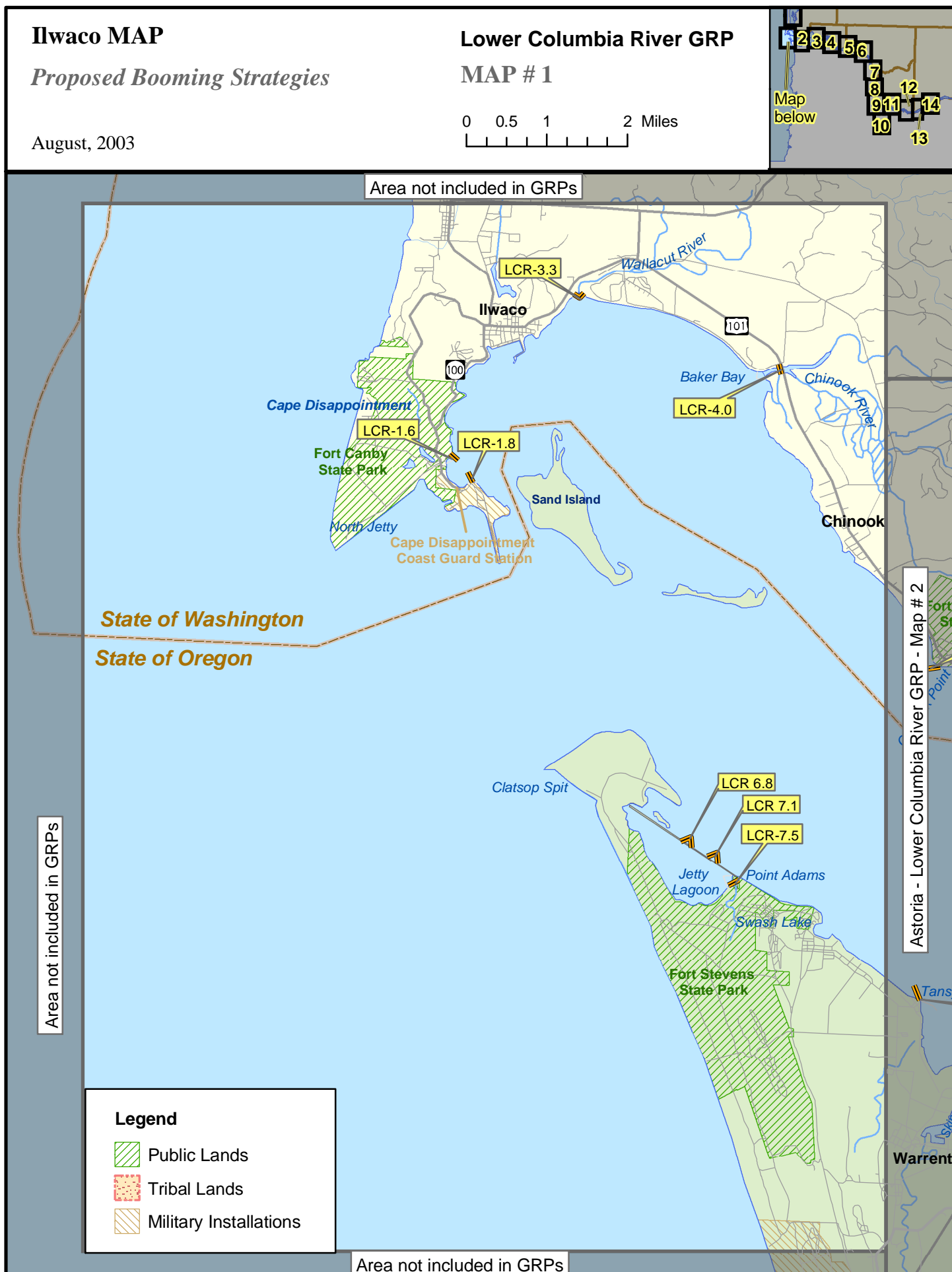
<b>Map # 12 – Camas</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-120.6
2	LCR-122.6
3	LCR-120.7
4	LCR-119.1

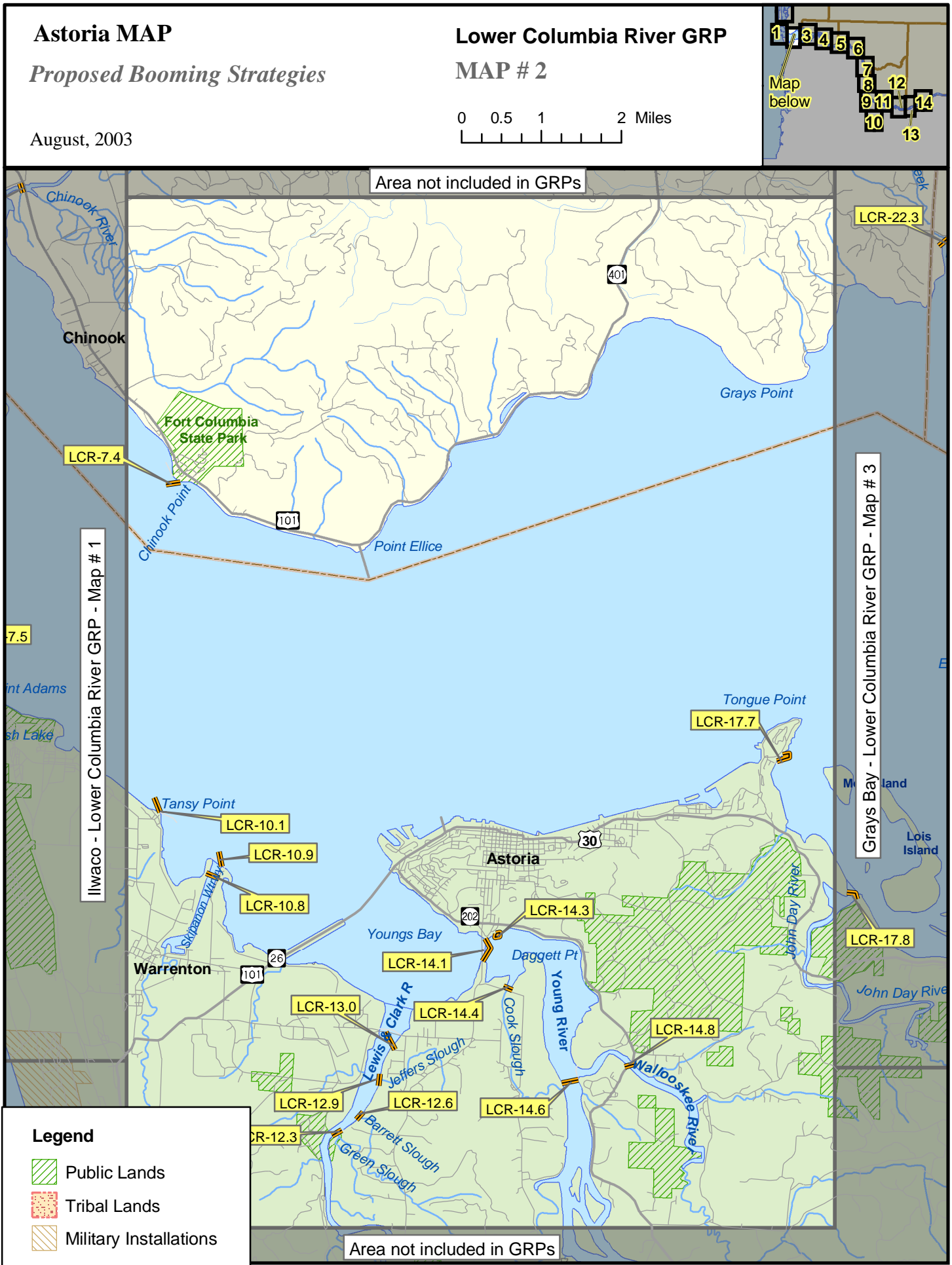
<b>Map # 14 – Bonneville</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	LCR-142.8
2	LCR-141.4
3	LCR-137.0
4	LCR-143.1
5	LCR-142.4

**4.2.2 Willamette River/ Multnomah Channel Priority Tables**

<b>Map # 9 – Portland</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	MC-2
2	MC-1
3	WR-0.9
4	WR-7.5
5	WR-6.9a & b
6	WR-5.8
7	MC-3a & b
8	WR-4.5
9	WR-3.7

<b>Map # 10 – Willamette River</b>	
<b>Priority</b>	<b>Strategy Number</b>
1	WR-26.1
2	WR-25.4
3	WR-25.0
4	WR-23.9
5	WR-23.8
6	WR-23.6
7	WR-23.1
8	WR-21.2
9	WR-18.5
10	WR-18.4











# Crims Island MAP

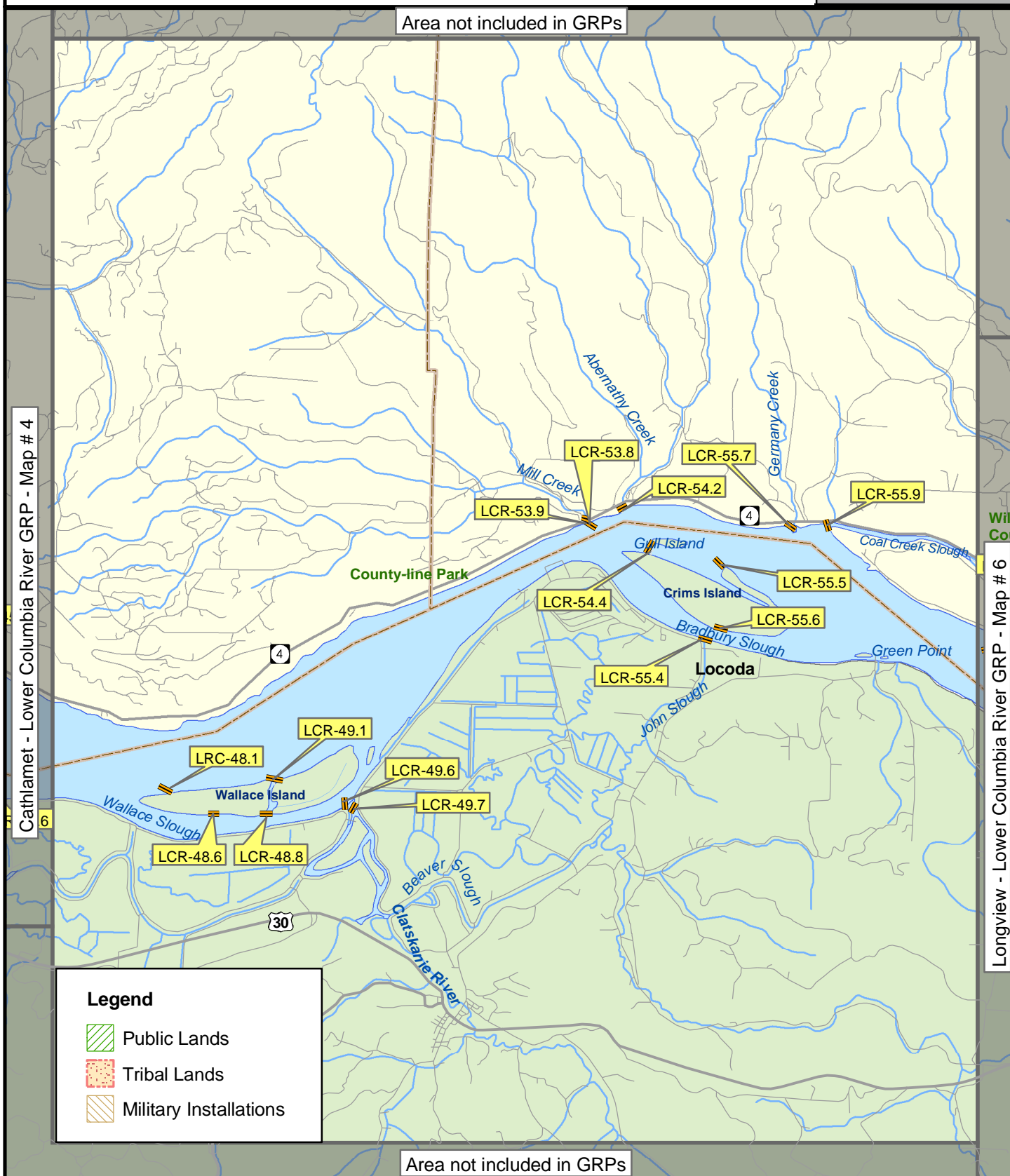
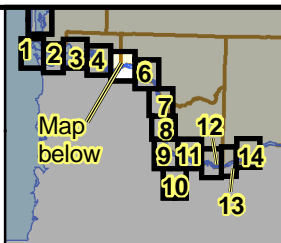
## Proposed Booming Strategies

August, 2003

# Lower Columbia River GRP

## MAP # 5

0 0.5 1 2 Miles



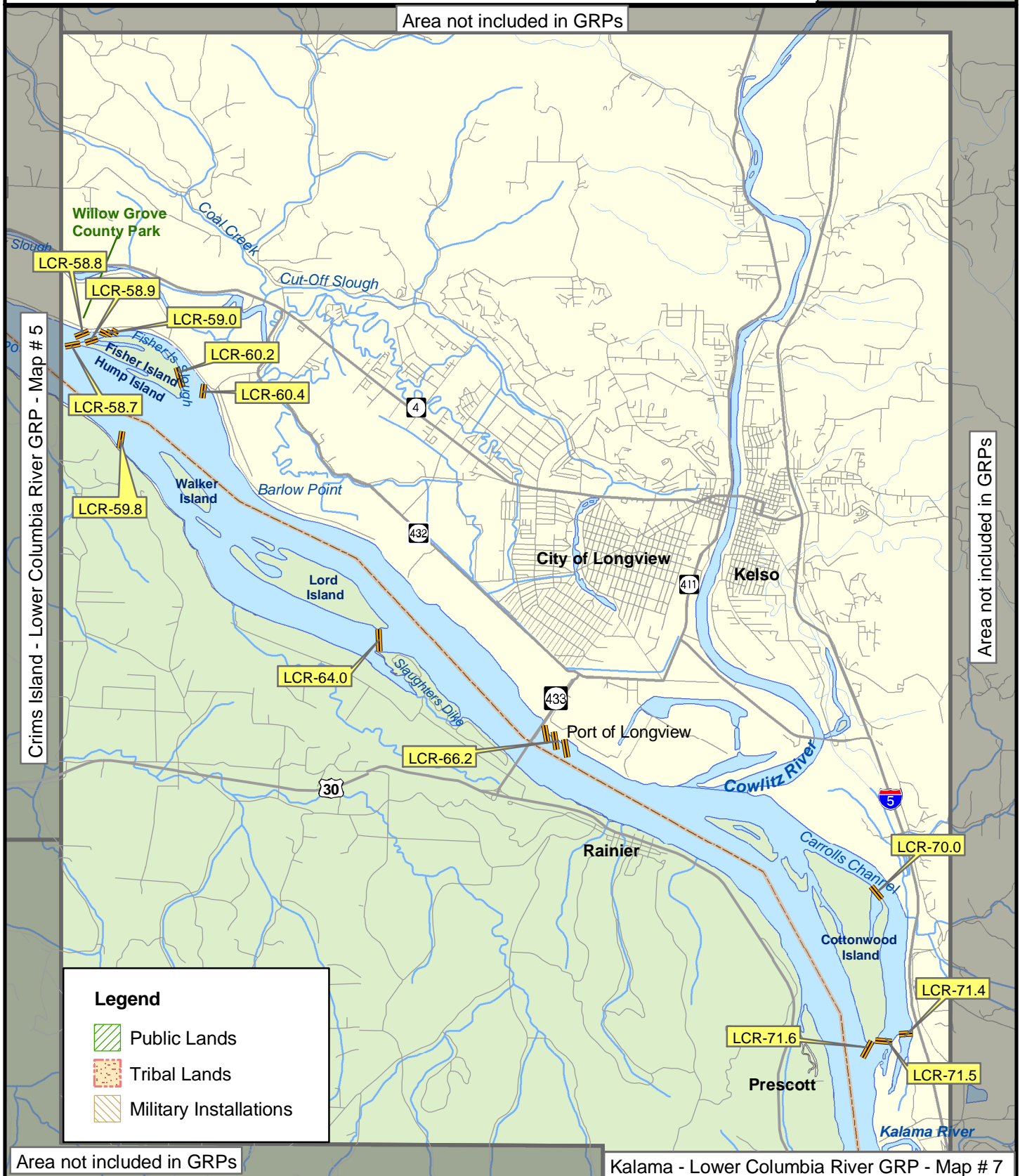
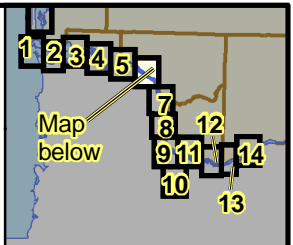


**Longview MAP***Proposed Booming Strategies*

August, 2003

**Lower Columbia River GRP****MAP # 6**

0 0.5 1 2 Miles



# Kalama MAP

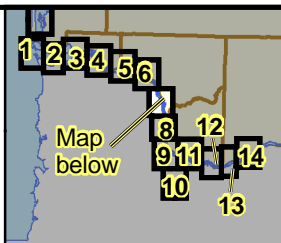
## Proposed Booming Strategies

August, 2003

# Lower Columbia River GRP

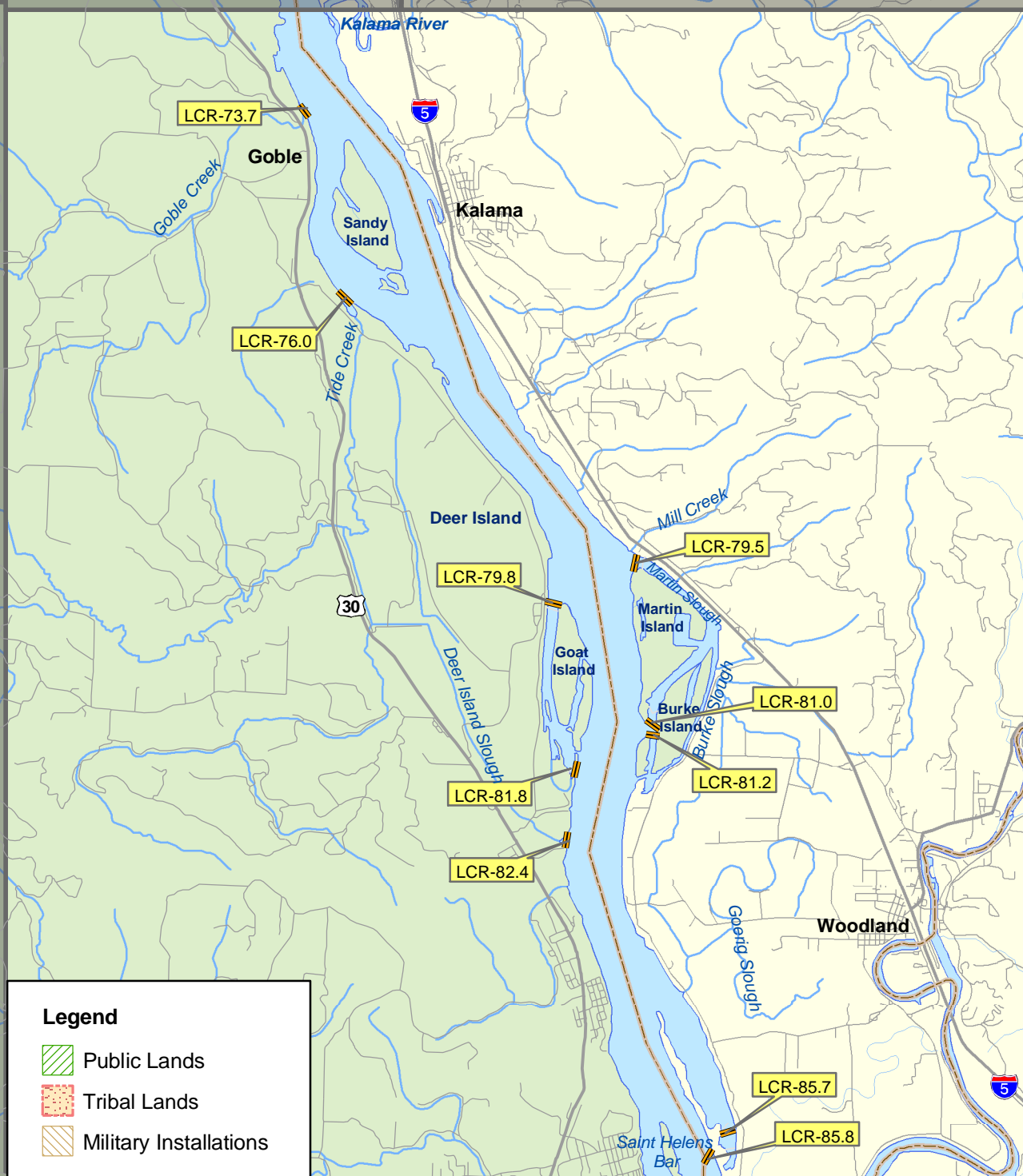
## MAP # 7

0 0.5 1 2 Miles



Longview - Lower Columbia River GRP - Map # 6

Area not included in GRPs



Area not included in GRPs

### Legend

- Public Lands
- Tribal Lands
- Military Installations

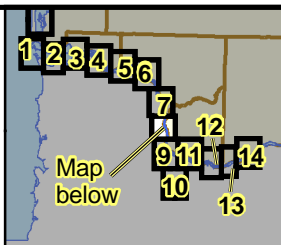
St Helens - Lower Columbia River GRP - Map # 8

**St Helens MAP***Proposed Booming Strategies*

August, 2003




**Lower Columbia River GRP****MAP # 8**

0 0.5 1 2 Miles



Kalama - Lower Columbia River GRP - Map # 7

**Legend**

-  Public Lands
-  Tribal Lands
-  Military Installations

Saint Helens

LCR-85.7

LCR-85.8

LCR-87.3

LCR-87.6

Bachelor Island

Ridgefield

Ridgefield National Wildlife Refuge

LCR-91.0

LCR-92.3

Campbell Lake

Willow Point

LCR-94.5

LCR-94.3

Post Office Lake

Willow Bar Islands

Horseshoe Island

Portland - Lower Columbia River GRP - Map # 9

LCR-97.5

LCR-98.6

Area not included in GRPs

Area not included in GRPs

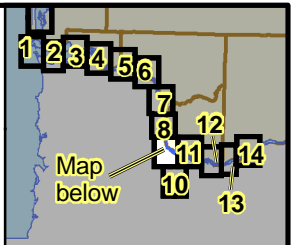
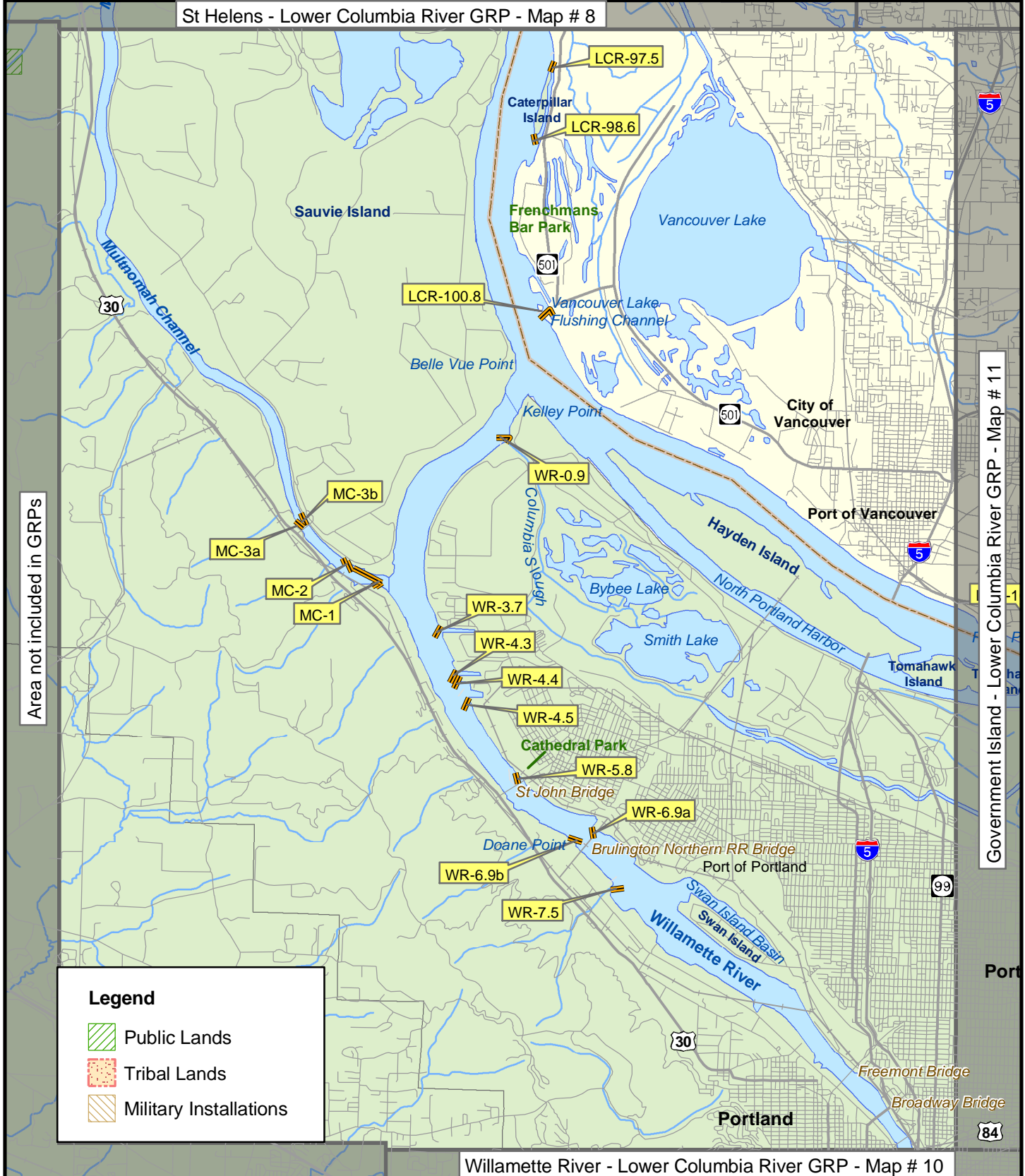


**Portland MAP***Proposed Booming Strategies*

August, 2003

**Lower Columbia River GRP****MAP # 9**

0 0.5 1 2 Miles

**St Helens - Lower Columbia River GRP - Map # 8**

# Willamette River MAP

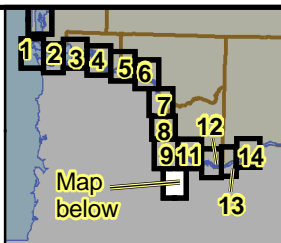
## Proposed Booming Strategies

August, 2003

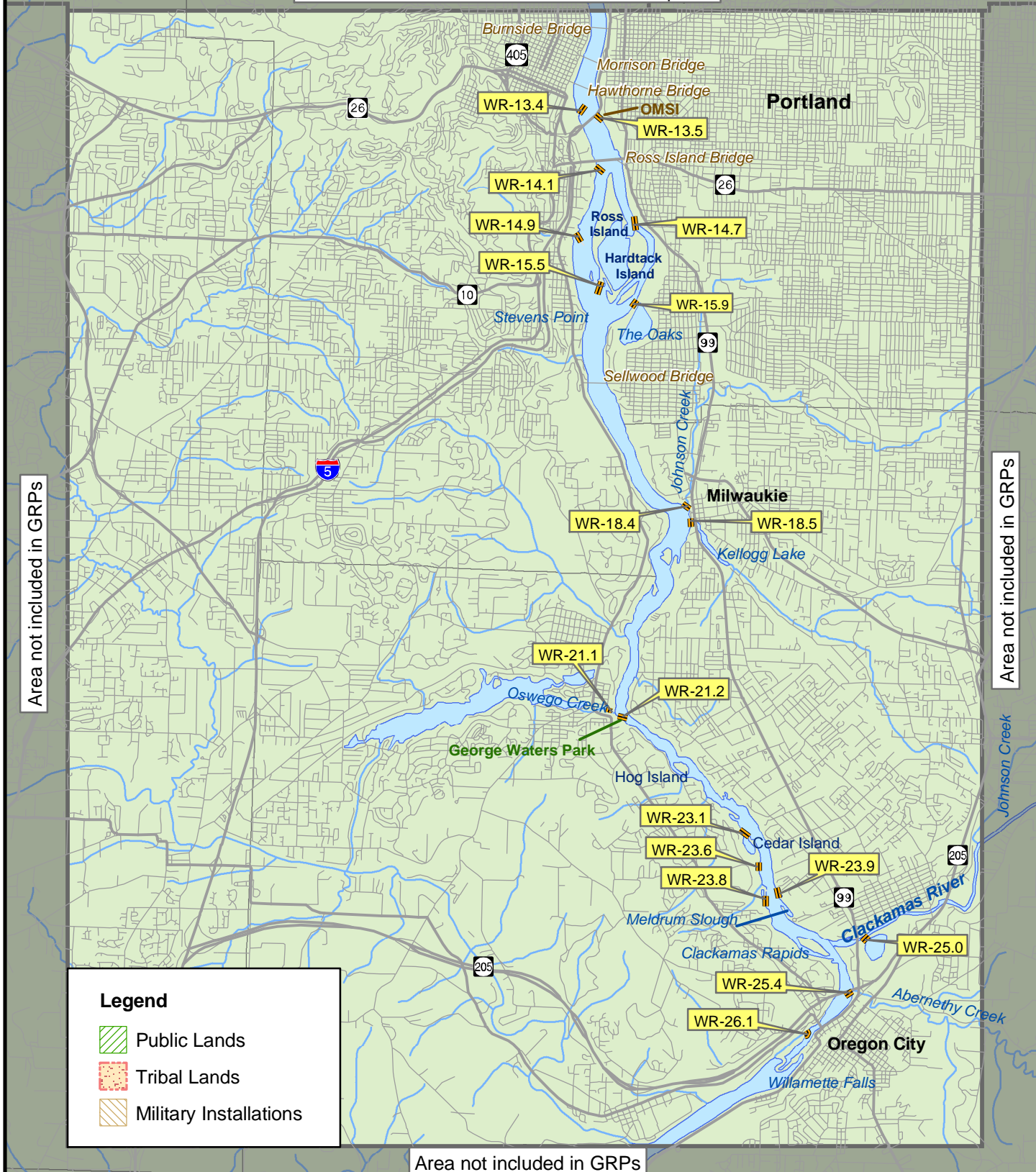
# Lower Columbia River GRP

## MAP # 10

0 0.5 1 2 Miles



Portland - Lower Columbia River GRP - Map # 9





# Government Island MAP

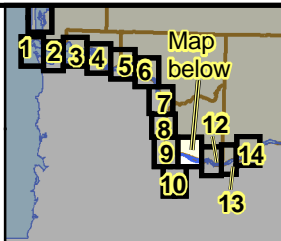
## Proposed Booming Strategies

August, 2003

# Lower Columbia River GRP




## MAP # 11

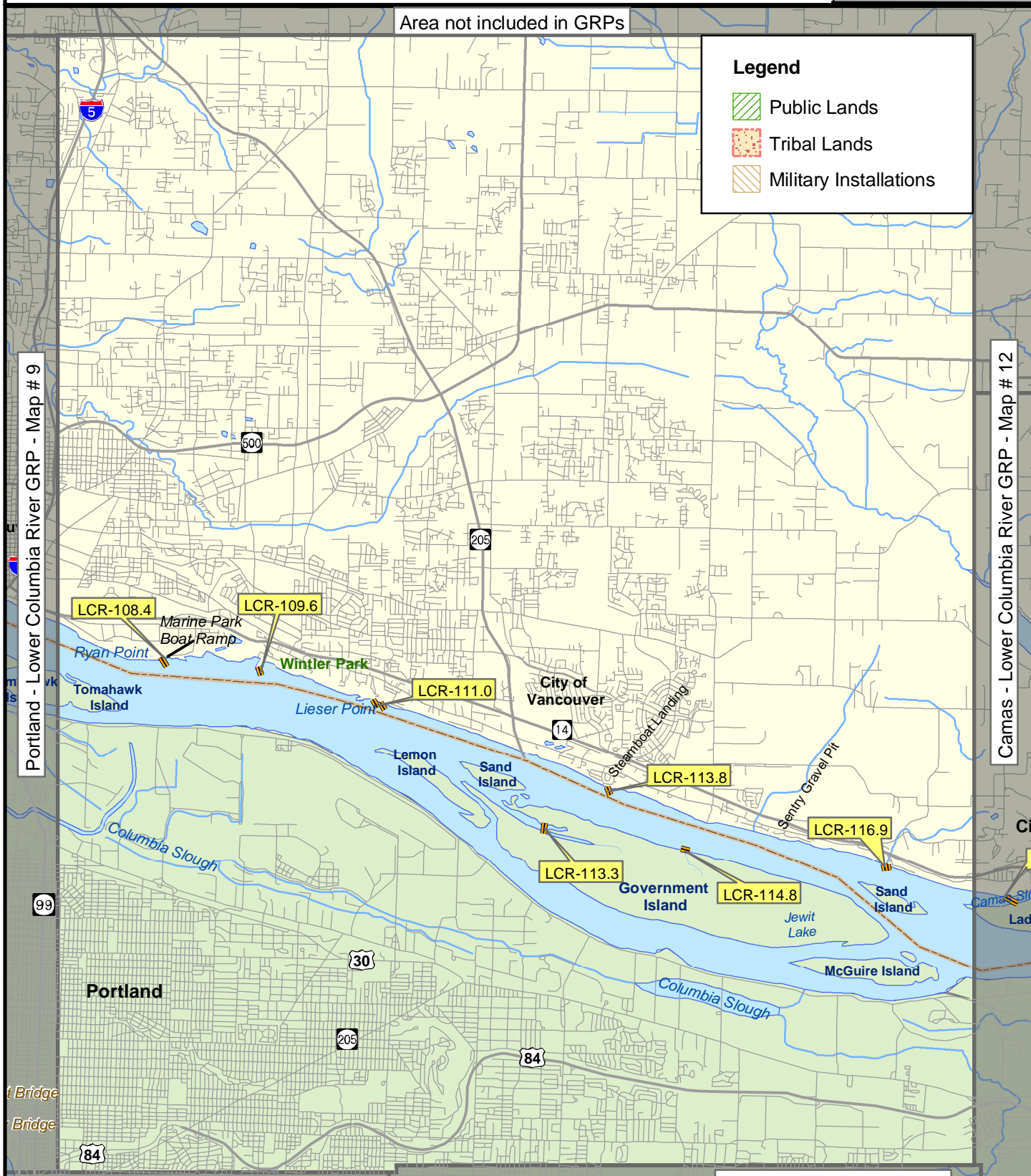
0 0.5 1 2 Miles



Area not included in GRPs

### Legend

-  Public Lands
-  Tribal Lands
-  Military Installations



Portland - Lower Columbia River GRP - Map # 9

Camas - Lower Columbia River GRP - Map # 12

Willamette River - Lower Columbia River GRP - Map # 10

Area not included in GRPs

# Camas MAP

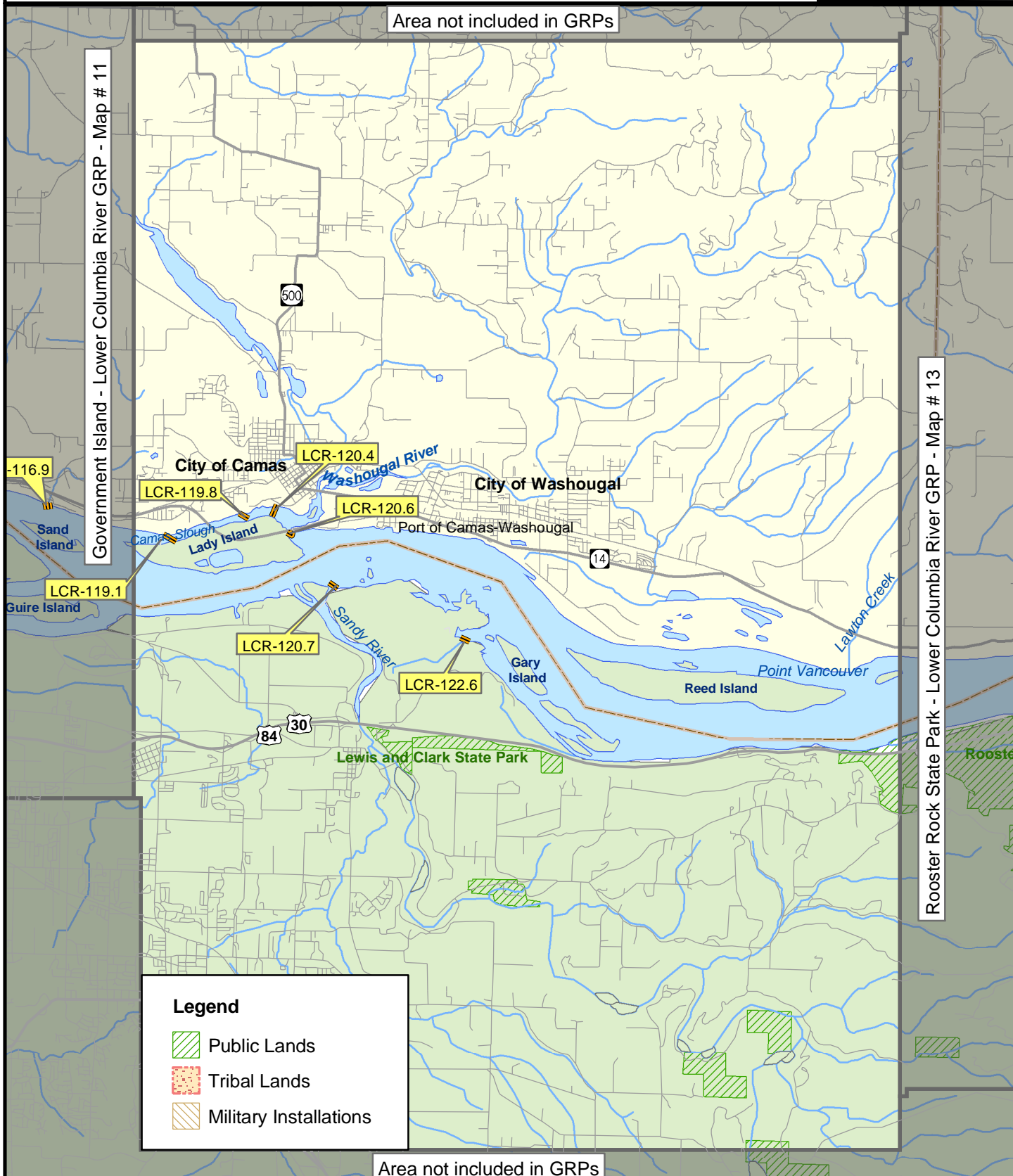
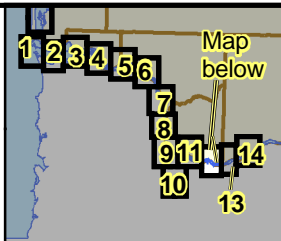
## Proposed Booming Strategies

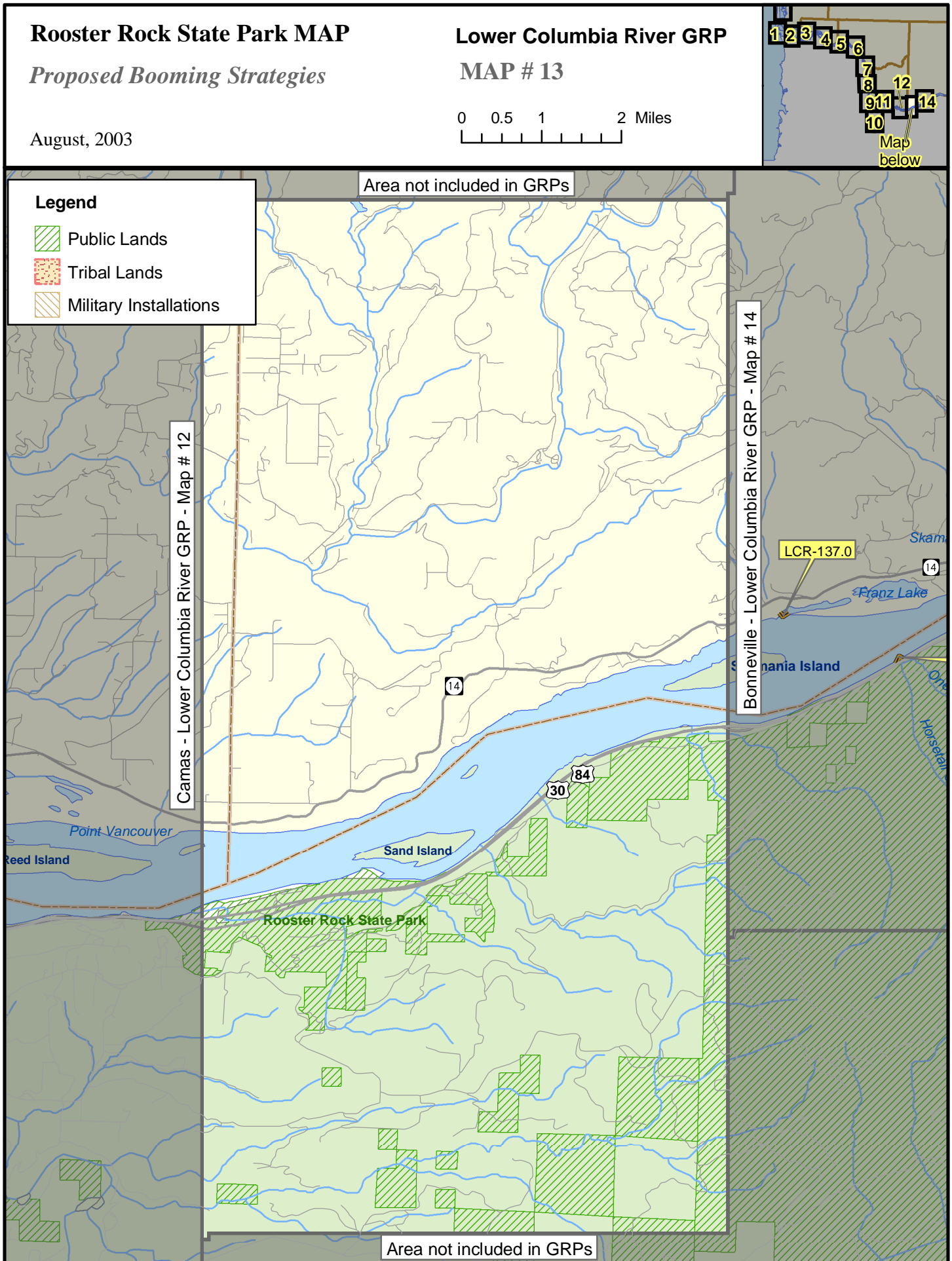
August, 2003

# Lower Columbia River GRP

## MAP # 12

0 0.5 1 2 Miles





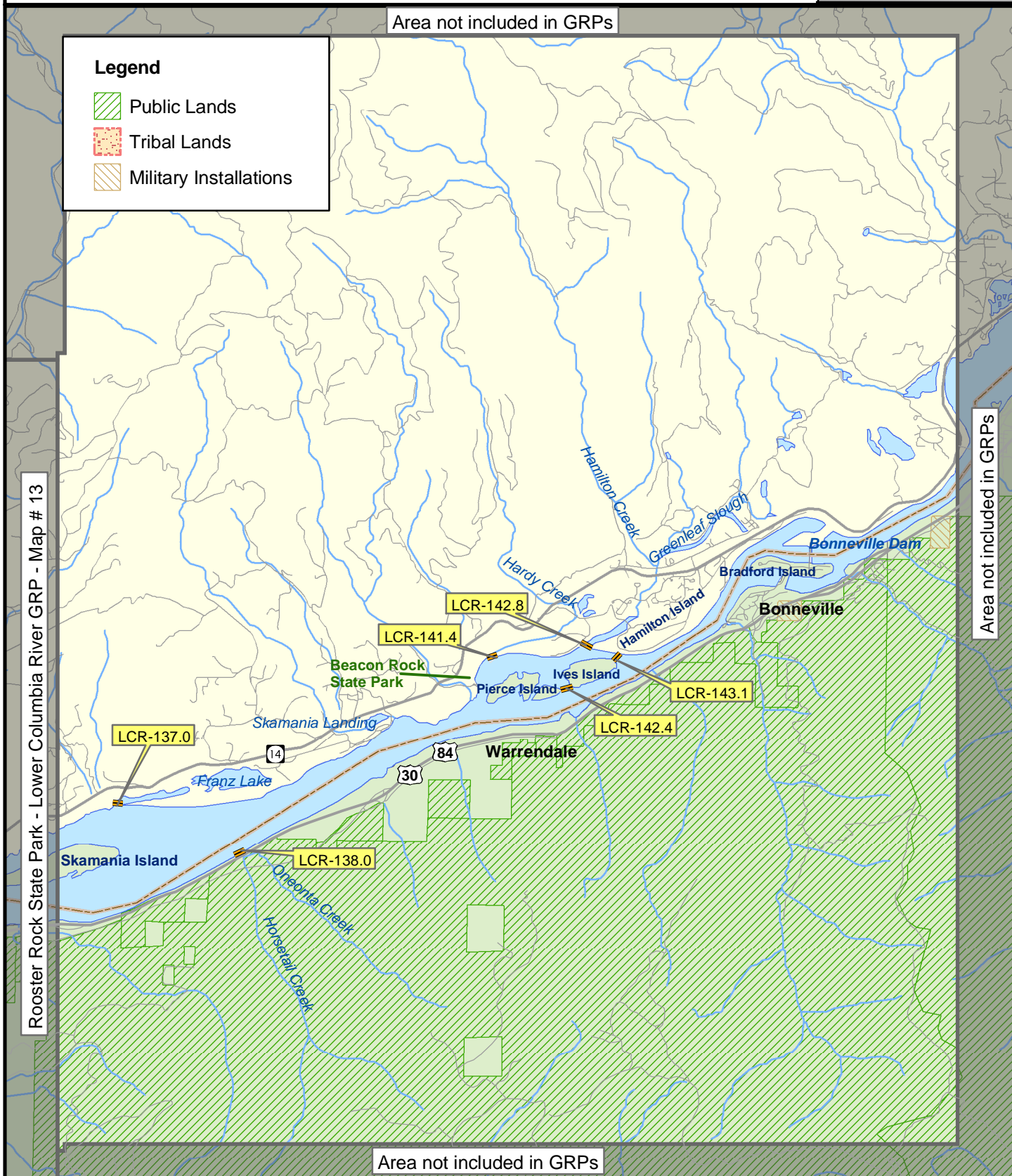
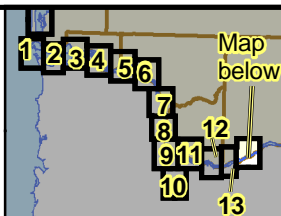


**Bonneville MAP***Proposed Booming Strategies*

August, 2003

**Lower Columbia River GRP****MAP # 14**

0 0.5 1 2 Miles



**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-1.6	Field visit 4/94	Fort Canby State Park (WA) PAC0570 46°-17.130'N 124°-03.017'W	Diversion / Collection - Protect eelgrass beds.	Any flow	300'	Angle from daymarker "15" to divert oil into natural collection point near Fort Canby boat launch. Strategy is designed for flood tide only.	Fort Canby State Park (will not be available during Buoy 10 fishery) and/or USCG Station Cape Disappointment.	By boat from the Fort Canby boat launch.	Eelgrass beds, Baker Bay is important year-round; herring spawning occurs in June.
LCR-1.8	Field visit 4/94	USCG Station Cape Disappointment (WA) PAC0568 46°-16.853'N 124°-02.719'W	Diversion / Collection - Protect eelgrass beds.	Any flow	300'	Angle from station to divert oil into natural collection point near Fort Canby boat launch. Strategy is designed for flood tide only.	USCG Station Cape Disappointment.	Fort Canby boat launch and/or USCG Station.	Eelgrass beds, Baker Bay is important year-round; herring spawning occurs in June.
LCR-3.3	Field visit 4/94	Wallacut River (WA) PAC0568 46°-16.853'N 124°-02.719'W	Exclusion - Keep oil out of river.	Any flow	200'	Close off mouth of river. Tide gates over Wallacut R. on Stringtown Rd. may act as barrier to oil. Minimize disturbance of shoreline and back-beach areas around river mouth. Use established roads only for vehicle access.	Ilwaco and/or USCG Station Cape Disappointment.	Best access by road on private property. Take 101 toward Ilwaco, just past Stringtown Rd turn left onto property with blue corrugated steel building (may need to carry boat to river edge from road)	Sensitive shoreline and back-beach around river mouth, wetland.
LCR-4.0	Field visit 4/94	Chinook River (WA) PAC0568 46°-16.853'N 124°-02.719'W	Exclusion - Protect river and wetlands.	Any flow	200'	Close off mouth of river. Tide gates at bridge over Chinook R. on Hwy 101 may act as a barrier to oil.	Ilwaco and/or USCG Station Cape Disappointment.	101 to Ilwaco, left on Stringtown Rd. just after crossing the Chinook River bridge. Can reach river via small access road on the left (may need to carry boat to rivers edge).	Wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-6.8	New strategy 11/03	Jetty Lagoon-west opening (OR) 46°-12.990'N 123°-58.960'W	Exclusion - Keep oil out of the lagoon.	Any flow	200'	Deploy boom in a chevron configuration on the river side of the west jetty opening. Flow through the opening can be high during tidal exchanges, add boom as necessary to prevent entrainment. Opening position needs to be verified.	Port of Astoria, Pier 2.	Boat access only.	Waterfowl & shorebirds, wetland habitat, juvenile salmonids.
LCR-7.1	New strategy 11/03	Jetty Lagoon-east opening (OR) 46°-12.870'N 123°-58.640'W	Exclusion - Keep oil out of the lagoon.	Any flow	200'	Deploy boom in a chevron configuration on the river side of the west jetty opening. Flow through the opening can be high during tidal exchanges, add boom as necessary to prevent entrainment. Opening position needs to be verified.	Port of Astoria, Pier 2.	Boat access only.	Waterfowl & shorebirds, wetland habitat, juvenile salmonids.
LCR-7.4	No field visit/ test	Chinook Point (WA) PAC0568 46°-16.853'N 124°-02.719'W	Deflection - Protect shoreline.	Low flow	500'	Deflect away from Fort Columbia State Park shoreline.	Fort Columbia State Park.	Fort Columbia State Park.	Fort Columbia State Park; recreational shoreline.
LCR-7.5	Field test 1/94; Field visit 2/97	Swash Lake (OR) 46°-12.652'N 123°-58.337'W	Exclusion - Keep oil out of lake.	Any flow	600'	Close off inlet to lake - access by land from Warrenton.	Port of Astoria, Pier 2.	By vehicle from the Fort Stevens State Park service road.	Waterfowl & shorebirds, wetland habitat.
LCR-10.1	Field test 1/94; Field visit 2/97	Tansy Point (OR) 46°-11.484'N 123°-55.342'W	Deflection / Collection - Prevent oil from getting further into Youngs Bay.	Low flow	400'	Angle into current to deflect oil to collection point (tend booms w/boat). Will work with a NW wind and a flood tide.	Warrenton	Boat access and by land at wood chipping company (need permission of company).	
LCR-10.8	Field test 1/94; Field visit 2/97	Inner Skipanon Waterway (OR) 46°-10.790'N 123°-54.480'W	Exclusion - Keep oil out of inner waterway.	Low flow	800'	Deploy boom further up waterway. Strategy will work well with a NW wind and a flood tide.	Marina approximately 2 miles upriver.	Marina approximately 2 miles upriver / access via sandy spit collection points.	Salmon concentrations and habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

<b>Strategy</b>	<b>Status</b>	<b>Location</b>	<b>Response Strategy</b>	<b>Flow Level</b>	<b>Length of Boom</b>	<b>Strategy Implementation</b>	<b>Staging Area</b>	<b>Site Access</b>	<b>Resources Protected</b>
LCR-10.9	Field test 1/94; Field visit 2/97	Outer Skipanon Waterway (OR) 46°-10.953'N 123°-54.323'W	Deflection/ Collection - Deflect oil into waterway for collection.	Low flow	300'	Angle boom into current to deflect oil to collection point on S. shoreline at sandy beach (tend boom w/tug). Strategy will work well with a NW wind and a flood tide.	Marina approximately 2 miles upriver.	Marina approximately 2 miles upriver / access via sandy spit collection points.	Salmon concentrations and habitat.
LCR-12.3	Field test 1/94; Field visit 2/97	Green Slough (OR) 46°-08.035'N 123°-52.342'W	Exclusion - Keep oil out of river.	Low flow	300'	Deploy boom across the entrance to the slough as a backup to the Lewis and Clark River strategy.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point.	Wintering waterfowl, Fort Clatsop National Park, foraging shorebirds and seabirds.
LCR-12.6	Field test 1/94; Field visit 2/97	Barrett Slough (OR) 46°-08.231'N 123°-51.996'W	Exclusion - Keep oil out of river.	Low flow	300'	Deploy boom across the entrance to the slough as a backup to the Lewis and Clark River strategy.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point	Wintering waterfowl, Fort Clatsop National Park, foraging shorebirds and seabirds.
LCR-12.9	Field test 1/94; Field visit 2/97	Jeffers Slough (OR) 46°-08.658'N 123°-51.717'W	Exclusion - Keep oil out of river.	Low flow	300'	Deploy boom across the entrance to the slough as a backup to the Lewis and Clark River strategy.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point.	Wintering waterfowl, Fort Clatsop National Park, foraging shorebirds and seabirds.
LCR-13.0	Field test 1/94; Field visit 2/97	Lewis and Clark River (OR) 46°-09.163'N 123°-51.606'W	Exclusion - Keep oil out of river.	Low flow	1200'	Deploy boom at an angle from the west end of the bridge to the south and east for collection on the east shoreline. This is a working channel so leave boom open until oil seen & put out notice to mariners.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point.	Wintering waterfowl, Fort Clatsop National Park, foraging shorebirds and seabirds.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-14.1	Field test 1/94; Field visit 2/97	Youngs River (OR) 46°-10.140'N 123°-50.200'W	Exclusion - Keep oil out of River.	Low flow	2000'	Deploy boom from each end of the bridge on Hwy alt 102 in a chevron configuration and collect at the apex with a skimmer. This strategy may be difficult or impossible to deploy if the current is too strong.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point.	Wild and hatchery Salmon (Clatsop County Fish Pens) Great Blue Heron rookery, marina fisheries, shorebird and seabird foraging area, sturgeon, sensitive nesting species, waterfowl and crustaceans.
LCR-14.3	Field test 1/94; Field visit 2/97	Youngs River Fish Pens (OR) 46°-10.275'N 123°-50.000'W	Exclusion - Keep oil out of Pens.	Any flow	1600'	Deploy boom in a double chevron configuration to surround each pen.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point	Salmon (Clatsop County Fish Pens)
LCR-14.4	Field test 1/94; Field visit 2/97	Cook Slough (OR) 46°-09.709'N 123°-49.784'W	Exclusion - Keep oil out of slough.	High flow	200'	Place boom across slough entrance. May be a tide gate, deploy boom if gate leaks or cannot be closed.	Port of Astoria, Pier 2.		Wetland habitat
LCR-14.6	Field test 1/94; Field visit 2/97	Youngs River at mouth of the Wallooskee River (OR) 46°-08.760'N 123°-48.780'W	Exclusion - Keep oil out of River.	Low flow	1400'	Deploy boom across the river just south of the mouth of the Wallooskee River.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point.	Wild and hatchery Salmon, Great Blue Heron rookery, marina fisheries, shorebird and seabird foraging area, sturgeon, sensitive nesting species, waterfowl and crustaceans.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-14.8	New strategy 3/03	Wallooskee River at bridge (OR) 46°-08.947'N 123°-47.822'W	Exclusion/ Collection - Keep oil out of river, collect at bridge.	Low flow	700'	Deploy boom across the river on the downstream side of the bridge at Highway 202 at an angle to collect on the north side.	Port of Astoria, Pier 2.	Access by boat from launch at Yacht Club near bridge or at Tides Point across from Daggett Point, vehicle access from Highway 202.	Wild and hatchery Salmon, Great Blue Heron rookery, marina fisheries, shorebird and seabird foraging area, sturgeon, sensitive nesting species, waterfowl and crustaceans.
LCR-17.7	New strategy 3/03	Tongue Point - ODFW Salmon Net Pens (OR) 46°-12.297'N 123°-45.697'W	Exclusion - Keep oil out of the net pens.	Any flow	2000'	Deploy boom around the net pens and pier at the north end of the USCG Station on Tongue Point.	Tongue Point USCG Station.	Access by boat or vehicle from the USGC Station.	ODFW salmon net pens.
LCR-17.8	Field test 4/96	John Day River (OR) 46°-10.857'N 123°-44.400'W	Exclusion - Keep oil out of river.	Any flow	800'	Deploy boom in a chevron configuration around the RR trestle so as not to interfere with swinging bridge. Railroad track is operational, could bring in railcar for oil storage.	Tongue Point USCG Station.	Access via boat or railcar.	Waterfowl, other sensitive nesting species, wetlands, year-round.
LCR-19.3	Field visit 4/94	Twilight Marsh (Eskeline Creek) (OR) 46°-10.230'N 123°-41.890'W	Exclusion - Keep oil out of marsh and creek	Any flow	100'	Deploy boom in front of the railroad trestle, located about 2.3 miles east of the John Day River. Lay sorbents around interior of marshy areas. Possible to pump oil onto a railcar.	Tongue Point USCG Station	Access via boat or railcar	Sensitive nesting species, year-round.
LCR-19.9	New strategy 3/03	Marys Creek (OR) 46°-10.395'N 123°-40.022'W	Exclusion - Keep oil out of creek	Any flow	200'	Deploy boom in front of the railroad trestle, at the mouth of the creek. Possible to pump oil onto a railcar.	Tongue Point USCG Station	Access via boat or railcar	Salmon concentrations and habitat.
LCR-20.0	New strategy 3/03	Bear Creek (OR) 46°-10.320'N 123°-39.855'W	Exclusion - Keep oil out of creek	Any flow	200'	Deploy boom in front of the railroad trestle, at the mouth of the creek. Possible to pump oil onto a railcar.	Tongue Point USCG Station	Access via boat or railcar	Salmon concentrations and habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

<b>Strategy</b>	<b>Status</b>	<b>Location</b>	<b>Response Strategy</b>	<b>Flow Level</b>	<b>Length of Boom</b>	<b>Strategy Implementation</b>	<b>Staging Area</b>	<b>Site Access</b>	<b>Resources Protected</b>
LCR-20.3	New strategy 3/03	Ferris Creek (OR) 46°-10.293'N 123°-39.253'W	Exclusion - Keep oil out of creek	Any flow	300'	Deploy boom in front of the railroad trestle, at the mouth of the creek. Possible to pump oil onto a railcar.	Tongue Point USCG Station	Access via boat or railcar	Salmon concentrations and habitat.
LCR-22.3	No field visit/test	Sission Creek Marsh (WA) WAH0004 46°-18.072'N 123°-43.400'W	Exclusion - Protect marsh of Brix Bay.	Any flow	500'	Close off creek mouth. Difficult to protect marsh at mouth due to low water. Possible to boom further upstream, but does not protect the desired habitat.	Tongue Point USCG Station.	Boat access only.	Jan-Aug sensitive nesting species.
LCR-22.4	Field visit 4/94	Deep River (WA) WAH0006 46°-18.740'N 123°-42.833'W	Exclusion - Keep oil out of river.	Any flow	600'	Deploy boom at angle across mouth of river to road on west side for possible collection - pilings slightly upriver (500'), will not be able to protect marsh near mouth.	Tongue Point USCG Station, or from boat launch parking lot.	Boat launch = Hwy 4 E., turn right on Oneida Rd just before Deep River bridge, 2.1 miles to launch. Harry Larson has key to launch (1st house on right on way out from launch).	Salmonid concentrations and habitat (peak numbers in Feb-July, and Sept-Dec).
LCR-23.6	Field visit 4/94	Crooked Creek (WA) WAH0011 46°-17.790'N 123°-40.567'W	Exclusion - Keep oil out of creek and wetlands.	Any flow	200'	Deploy boom across the creek mouth at the bridge. Only winds from the SW would drive oil into the creek mouth.	Hwy 4 E., right on Altoona - Pillar Rock Rd. (403), take a right just before bridge for boat launch and parking lot.	Road access on Altoona - Pillar Rock Rd (403); take to where it crosses Crooked Creek. Grays Bay is too shallow for access from Columbia River.	Salmonid concentrations and habitat; wetlands.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-24.1	Field visit 4/94	Grays River (WA) WAH0009 46°-18.540'N 123°-40.300'W	Exclusion - Prevent oil from entering river.	Any flow	500'	Deploy boom at an angle across the river near Oneida or at the bend of Devils Elbow, depending on access. Minimize disturbance of shoreline and back-beach areas. Use established roads only for vehicle access.	Hwy 4 E., right on Altoona - Pillar Rock Rd. take a right just before bridge for boat launch and parking lot.	Boat launch on Grays river, too shallow to come in from Grays Bay.	Sensitive shoreline and back-beach, salmonid concentrations and habitat (peak numbers in Feb-July, and Sept-Dec).
LCR-24.5	Field test 1/94	Miller Sands Island and Lagoon (OR) 46°-14.910'N 123°-38.440'W	Deflection - Protect lagoon and island.	Low flow	1000'	Angle off piling at E. end of island to deflect oil into main channel. Sand bar east of Miller Sands Island makes lagoon inaccessible. Other than the main channel, the water around Island is very shallow.	Tongue Point USCG Station.	Tongue Point USCG Station.	Lagoon - high primary productivity, juvenile fish foraging, waterfowl concentration, sensitive nesting species, goose brooding, year-round.
LCR-26.4	Field test 2/97	Karlson Island (OR) 46°-12.333'N 123°-36.915'W	Exclusion - Protect wetlands behind dike, south of Karlson Island.	Any flow	400'	Deploy boom across breach in dike.	Tongue Point USCG Station or old ferry dock at Knappa.	Access from water only.	Freshwater marsh, waterfowl concentration, sensitive nesting area (F,W, Spr). Highly vegetated underwater with high tides.
LCR-27.2	Field visit 2/97	Big Creek (OR) 46°-11.090'N 123°-35.695'W	Exclusion - Keep oil out of creek.	Any flow	200'	Close off mouth of creek. Good structured sides along either bank.	Tongue Point USCG Station or old ferry dock at Knappa.	Access from water, or road access from town of Knappa.	Salmonid concentrations and habitat, wetlands. Protection required year-round.



**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-27.5	Field visit 2/97	Warren Slough (OR) 46°-11.340'N 123°-35.220'W	Exclusion - Keep oil out of slough.	Any flow	500'	Close off entrance to slough. Requires shallow draft skiff.	Knappa or Svensen.	Boat ramp at Aldridge Pt. or old ferry dock near Knappa. Road access off Hwy 30 via Waterhouse Rd.	Sensitive wetland area.
LCR-27.9	Field test 2/97	Grizzly Slough (OR) 46°-12.224'N 123°-33.915'W	Exclusion - Keep oil out of slough.	Any flow	400'	Close off entrance to slough. Requires shallow draft skiff. Grizzly Slough is up Blind Slough which is too large to boom off. Anchor to trees on either side.	Knappa or Svensen.	Boat ramp at Aldridge Pt. or old ferry dock near Knappa. Road access off Hwy 30 via Waterhouse Rd.	Sensitive wetland area.
LCR-29.2	Field visit 2/97	Gnat Creek (OR) 46°-11.962'N 123°-31.918'W	Exclusion - Keep oil out of Gnat Creek.	Any flow	200'	Close off entrance to Gnat Creek. Requires shallow draft skiff. Gnat Creek is up Blind Slough which is too large to boom off. Anchor to trees on either side.	Knappa or Svensen.	Boat ramp at Aldridge Pt. or old ferry dock near Knappa. Road access off Hwy 30 via Waterhouse Rd.	Sensitive wetland area.
LCR-33.2	Field test 1/94	Welch Island sloughs (OR) 46°-15.385'N 123°-29.088'W	Exclusion - Keep oil out of sloughs	Any flow	400'	Deploy boom across the entrance to the slough on the northwest corner of Welch Island.	USFWS refuge warehouse and dock on Tenasillahe Island.	Boat access only.	Lewis and Clark National Wildlife Refuge, sensitive wetland habitat.
LCR-33.3	Field test 1/94	Welch Island sloughs (OR) 46°-15.215'N 123°-29.020'W	Exclusion - Keep oil out of sloughs.	Any flow	500'	Deploy boom across the west entrance of the slough that runs through the middle of Welch Island.	USFWS refuge warehouse and dock on Tenasillahe Island.	Boat access only.	Lewis and Clark National Wildlife Refuge, sensitive wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-33.5	Field test 1/94	Skamokawa Creek and Brooks Slough (WA) WAH0058 46°-16.133'N 123°-27.307'W	Exclusion - Keep oil out of creek & slough.	Any flow	400'	Deploy boom across the mouth just before the junction of the creek and slough in a chevron configuration, from the seawall on the E. side to the pilling on the W. side. Use if oil is diverted into Steamboat Slough (LCR-35.1). Watch for boat traffic.	Skamokawa and/or Cathlamet.	Boat ramp at Skamokawa Vista Park.	Anadromous fish spawning stream.
LCT-33.7	Field test 1/94	Steamboat Slough - west end (oil moving upstream) (WA) WAH0059 46°-15.955'N 123°-27.233'W	Diversion / Collection - Divert oil out of main channel to collection point in Steamboat Slough.	Low flow	1,200'	If oil is moving upstream: angle 500' of boom from the W. end of Price Island to deflect oil inside slough. Deploy 700' of boom from the W. end of Price Island to the opposite shore for collection.	Skamokawa and/or Cathlamet.	Steamboat Slough road comes next to water for possible vac truck oil recovery - slough has N & S water access.	Shrub/scrub on the N. & S. side dike, S. side additionally emergent wetlands, sensitive nesting species. N. side includes deer habitat.
LCR-34.4	Field test 1/94	NW entrance to Red Slough between Welch and Tenasillahe Islands (OR) 46°-14.467'N 123°-28.655'W	Exclusion - Keep oil out of slough.	Any flow	800'	Deploy boom across the NW entrance to Red Slough. Close tide gates, contact USFWS through Wahkiakum County Sheriff.	USFWS Refuge warehouse and dock on Tenasillahe Island side of slough.	Boat access only.	Emergent wetlands throughout slough.
LCR-34.6	Field test 1/94	Welch Island sloughs (OR) 46°-14.907'N 123°-27.472'W	Exclusion - Keep oil out of sloughs.	Any flow	500'	Deploy boom across the east entrance of the slough that runs through the middle of Welch Island.	USFWS refuge warehouse and dock on Tenasillahe Island.	Boat access only.	Lewis and Clark National Wildlife Refuge, sensitive wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-34.7	Field test 1/94	SW entrance to Red Slough between Welch and Tenasillahe Islands (OR) 46°-14.132'N 123°-28.570'W	Exclusion - Keep oil out of slough.	Any flow	600'	Deploy boom across the SW entrance to Red Slough. Close tide gates, contact USFWS through Wahkiakum County Sheriff.	USFWS Refuge warehouse and dock on Tenasillahe Island side of slough.	Boat access only.	Emergent wetlands throughout slough.
LCR-35.0	Field test 1/94	East entrance to Red Slough between Welch and Tenasillahe Islands (OR) 46°-14.593'N 123°-27.107'W	Exclusion - Keep oil out of slough.	Any flow	800'	Deploy boom across the East entrance to Red Slough. Close tide gates, contact USFWS through Wahkiakum County Sheriff.	USFWS Refuge warehouse and dock on Tenasillahe Island side of slough.	Boat access only.	Emergent wetlands throughout slough.
LCR-35.1	Field test 1/94, and 3/01.	Steamboat Slough - east end (oil moving downstream) (WA) WAH0064 46°-14.093'N 123°-26.127'W	Diversion / Collection - Divert oil out of main channel to collection point in Steamboat Slough.	Low flow	1,200'	If the oil moving downstream: angle 500' of boom from the E. end of Price Island to deflect oil inside the slough. Deploy 700' of boom from the E. end of Price Island to the opposite shore next to Steamboat Slough Road for collection with a vac truck.	Skamokawa and/or Cathlamet.	Steamboat Slough road comes next to water for possible vac truck oil recovery - slough has N & S water access.	Shrub/scrub on the N. & S. side dike, S. side additionally emergent wetlands, houseboats, sensitive nesting species. N. side includes deer habitat.
LCR-36.0	Field test 1/94	Elochoman Slough - north entrance (WA) WAH0067 46°-14.370'N 123°-25.150'W	Deflection/ Exclusion - Protect entrance to slough.	Any flow	500'	Deploy boom across north entrance to slough. Relatively slow current (1-1.5 knots) in slough.	USFWS barn just north of site. Cathlamet Marina offers fuel and food.	Vehicle and vac truck access from Steamboat Island Road. Boat ramp at Cathlamet marina.	Shrub/Scrub on both shores, wetland habitat, Columbia Whitetail deer habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-37.0	Field test 1/94	Elochoman River (WA) 46°-13.610'N 123°-23.995'W	Deflection/ Exclusion - Keep oil out of river.	Any flow	500'	Boom across mouth of river to protect wetlands from oil deflected into slough due to strategy LCR-38.0. Relatively slow current (1-1.5 knots) in slough.	USFWS barn just north of site. Cathlamet Marina offers fuel and food.	Vehicle and vac truck access from Steamboat Island Road. Boat ramp at Cathlamet marina.	Wetland habitat.
LCR-37.2	Field test 1/94	Elochoman Slough - middle entrance (WA) WAH0071 46°-13.272'N 123°-24.810'W	Deflection/ Exclusion - Protect entrance to slough.	Any flow	800'	Deploy boom across the middle entrance to the slough. Relatively slow current (1-1.5 knots) in slough. Log rafts may be present in this area.	USFWS barn just north of site. Cathlamet Marina offers fuel and food.	From gravel pit and lumber yard, can run vac truck down to water. Boat ramp at Cathlamet marina.	Shrub/Scrub on both shores, wetland habitat, Columbia Whitetail deer habitat.
LCR-37.7	Field test 4/97	Clifton Channel (OR) 46°-13.145'N 123°-27.735'W	Deflection/ Collection - Prevent oil from continuing downstream.	Any flow	500'	Deploy boom from the SW shore of Tenasillahe Island for collection of oil that enters the channel; poor access requires portable skimmers. Boom needs to be tended, current is 2-4 knots, strong winds. Log rafts may be present in this area.	USFWS barn just north of site. Cathlamet Marina offers fuel and food.	Boat access only. Boat ramp at Westport Slough or at Cathlamet, private ramp at Aldridge Pt.	Emergent wetlands. Downriver is extremely sensitive from this point.
LCR-37.9	Field test 1/94	Elochoman Slough - south entrance (WA) WAH0082 46°-12.450'N 123°-23.293'W	Deflection/ Collection - Deflect oil to the east shore at the Cathlamet Marina breakwater for collection.	Any flow	1000'	Deploy a doubled boom at an angle to collect oil from the breakwater at the Cathlamet Marina. Relatively slow current (1-1.5 knots) in slough. Log rafts may be present in this area.	Cathlamet Marina.	Vehicle access from the road on the breakwater. Boat ramp at the Cathlamet marina.	Shrub/Scrub on both shores. Columbia Whitetail deer habitat.
LCR-38.0	Field test 1/94	Elochoman Slough - south entrance (WA) WAH0082 46°-12.374'N 123°-23.390'W	Deflection - Deflect oil into slough entrance for collection at LCR-37.9.	Any flow	500'	Deploy boom from the S.end of the island to deflect oil inside the slough for collection at LCR-37.9.	Cathlamet Marina.	Vehicle access from the road on the breakwater. Boat ramp at the Cathlamet marina.	Shrub/Scrub on both shores. Columbia Whitetail deer habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-38.2	Field test 4/97	Clifton Channel (OR) 46°-12.720'N 123°-27.735'W	Deflection/ Collection - Prevent oil from continuing downstream.	Any flow	500'	Deploy boom from Clifton for collection of oil that enters the channel. Boom needs to be tended, current is 2-4 knots, strong winds. Log rafts may be present in this area.	Clifton or Cathlamet.	Vehicle access at Clifton. Railroad access along bank. Boat ramp at Westport Slough or at Cathlamet, private ramp at Aldridge Pt.	Emergent wetlands. Downriver is extremely sensitive from this point.
LCR-38.5	Field test 4/97, and 3/01.	Clifton Channel - north side entrance (OR) 46°-12.209'N 123°-25.983'W	Diversion - Deflect oil away from Clifton Channel/ sensitive shoreline.	Any flow	1000'	Deploy boom along the row of pilings at the south end of Tenasillahe Island. Boom may need to be tended, current is 2-4 knots, strong winds. Log rafts may be present in this area.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet, private ramp at Aldridge Pt.	Emergent wetlands. Downriver is extremely sensitive from this point.
LCR-38.8	Field test 4/97, and 3/01.	Clifton Channel - south side entrance (OR) 46°-11.910'N 123°-26.128'W	Diversion - Deflect oil away from Clifton Channel/ sensitive shoreline.	Any flow	500'	Deploy boom from the shore at Bradwood to deflect oil into the main channel. Boom needs to be tended, current is 2-4 knots, strong winds. Log rafts may be present in this area.	Cathlamet	Vehicle access difficult. Railroad access along bank. Boat ramp at Westport Slough or at Cathlamet, private ramp at Aldridge Pt.	Emergent wetlands. Downriver is extremely sensitive from this point.
LCR-40.5	Field test 1/94	Puget Island/ Bernie Slough - west end (WA) WAH0150 46°-11.547'N 123°-23.767'W	Exclusion - Protect inner sloughs.	Any flow	400'	Deploy boom across the west entrance of Bernie Slough, from Puget Island to Little Island.	Cathlamet	Vehicle access from roads on Puget Island or Little Island. Boat ramp at Westport Slough or at Cathlamet.	Great blue heron rookery, waterfowl use in winter.
LCR-41.1	Field test 3/97	Puget Island/ Welcome Slough (WA) WAH0107 46°-10.395'N 123°-24.230'W	Exclusion - Keep oil out of slough.	Any flow	300'	Deploy boom across the slough entrance.	Cathlamet	Possible vehicle access from private property. Boat ramp at Westport Slough or at Cathlamet.	Wetland habitat.

## 4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-41.6	Field test 3/97	Wauna (OR) 46°-09.670'N 123°-24.387'W	Deflection/ Collection.	Low flow	1,000'	Deploy two 500' booms in parallel, angled upstream; collect with skimmers/ vac trucks.	James River mill.	Boat ramp at Westport Slough or at Cathlamet.	Down-stream resources.
LCR-42.4	Field visit 3/97	Puget Island/ Bernie Slough - east end (WA) WAH0160 46°-10.420'N 123°-21.435'W	Exclusion - Protect inner sloughs.	Any flow	200'	Deploy boom across the east entrance of Bernie Slough, from Puget Island to Little Island.	Cathlamet	Possible vehicle access from private property. Boat ramp at Westport Slough or at Cathlamet.	Great blue heron rookery, waterfowl use in winter.
LCR-42.5	Field test 3/97	Driscoll Slough (OR) 46°-09.100'N 123°-23.745'W	Exclusion.	Any flow	300'	Deploy boom across the slough entrance.	James River mill.	Vehicle access from the mill. Boat ramp at Westport Slough or at Cathlamet.	Wetlands habitat.
LCR-43.2	Field test 3/97	Westport Slough (OR) 46°-08.228'N 123°-22.633'W	Exclusion/ Collection - Keep oil out of slough, collect at the boat ramp.	Any flow	700'	If the ferry is shut down, deploy boom just behind daymarker 58 over to pilings or trees on the west bank, diverting oil into the slough for collection. If necessary to keep the ferry running, move the boom site inside the slough past the ferry dock and protect the unnamed stream west of the ferry dock. Ferry traffic is a big issue.		US 30 to ferry dock.	Salmonid concentrations and habitat (peak concentrations during Aug - Oct).
LCR-44.3	Field visit 3/97	Puget Island/ East end sloughs - west entrance (WA) WAH0124 46°-09.062'N 123°-21.302'W	Exclusion - Keep oil out of sloughs.	Any flow	300'	Deploy boom across the west entrance to the sloughs. Slough is named "Net Rack Slough" on the USGS quad map. When the river is low, booming may not be necessary or feasible.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

<b>Strategy</b>	<b>Status</b>	<b>Location</b>	<b>Response Strategy</b>	<b>Flow Level</b>	<b>Length of Boom</b>	<b>Strategy Implementation</b>	<b>Staging Area</b>	<b>Site Access</b>	<b>Resources Protected</b>
LCR-45.0	Field visit 3/97	Puget Island/ East end sloughs - outer east entrance (WA) WAH0133 46°-09.890'N 123°-20.428'W	Exclusion - Keep oil out of sloughs.	Any flow	200'	Deploy boom across the outer east entrance to the sloughs. Boom between Jackson Island and Whites Island. When the river is low, booming may not be necessary or feasible.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Wetland habitat.
LCR-45.2	Field visit 3/97	Puget Island/ East end sloughs - inner east entrance (WA) WAH0132 46°-09.734'N 123°-20.295'W	Exclusion - Keep oil out of sloughs.	Any flow	200'	Deploy boom across the inner east entrance to the sloughs. Slough is named "Cut Off Slough" on the USGS quad map, and separates Puget Island from Whites Island; boom across north entrance. When the river is low, booming may not be necessary or feasible.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Wetland habitat.
LCR-45.6	Field visit 3/97	Puget Island/ East end sloughs - middle entrance (WA) WAH0127 46°-09.040'N 123°-19.920'W	Exclusion - Keep oil out of sloughs.	Any flow	300'	Deploy boom across the middle entrance to the sloughs. Slough is named "Cut Off Slough" on the USGS quad map, and separates Puget Island from Whites Island; boom across the south entrance. When the river is low, booming may not be necessary or feasible.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Wetland habitat.
LRC-48.1	New strategy 3/03	Wallace Island /Slough - northwest end (OR) 46°-08.455'N 123°-16.472'W	Exclusion - Keep oil out of sloughs	Any flow	500'	Deploy boom across the north entrance to the channel on the west end of Wallace Island. Water depth is likely to be very shallow. When the river is low, booming may not be necessary or feasible. Strong currents may prevent effective booming.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Waterfowl and Columbian whitetail deer



**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-48.6	Field test 1/94	Wallace Island /Slough - southwest end (OR) 46°-08.262'N 123°-15.806'W	Exclusion - Keep oil out of sloughs.	Any flow	500'	Deploy boom across the entrance to the channel on the southwest end of Wallace Island. Water depth is likely to be very shallow.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Waterfowl and Columbian whitetail deer
LCR-48.8	Field test 1/94	Wallace Island /Slough - south center (OR) 46°-08.243'N 123°-15.019'W	Exclusion - Keep oil out of sloughs.	Any flow	500'	Deploy boom across the south entrance to the center channel on Wallace Island. Water depth is likely to be very shallow.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Waterfowl and Columbian whitetail deer.
LCR-49.1	Field test 1/94	Wallace Island /Slough - north center (OR) 46°-08.568'N 123°-14.948'W	Exclusion - Keep oil out of sloughs.	Any flow	500'	Deploy boom across the north entrance to the center channel on Wallace Island. Water depth is likely to be very shallow.	Cathlamet	Boat access only. Boat ramp at Westport Slough or at Cathlamet.	Waterfowl and Columbian whitetail deer.
LCR-49.6	Field test 1/94	Beaver Slough / Clatskanie River west side (OR) 46°-08.349'N 123°-13.908'W	Diversion/ Collection - Divert oil into river mouth/ slough for collection.	Any flow	500'	Deploy boom from the point on the west side of the Clatskanie River mouth, angled into main channel of the Columbia River to divert oil into the river mouth/ slough for collection.	Cathlamet or Longview.	Boat access from Cathlamet, Westport Slough, or Longview. Vehicle access from Highway 30 to Point Adams Road.	Salmonid concentrations and habitat; wetlands.
LCR-49.7	Field test 1/94	Beaver Slough / Clatskanie River east side (OR) 46°-08.316'N 123°-13.726'W	Collection/ Exclusion - Collect oil and prevent oil from entering the inner slough/river.	Any flow	500'	Deploy boom across the Clatskanie River inside the mouth to collect oil and prevent oil from entering the slough and moving up the river.	Cathlamet or Longview.	Boat access from Cathlamet, Westport Slough, or Longview. Vehicle access from Highway 30 to Point Adams Road.	Salmonid concentrations and habitat; wetlands.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-53.8	New strategy 3/03	Mill Creek Slough (WA) 46°-11.335'N 123°-10.585'W	Collection - Prevent oil from moving downstream.	Any flow	500'	Deploy boom at an angle from the point on the west side (downstream) of the mouth of Mill Creek, upstream and towards the middle of the river to collect oil moving along the Washington shore. Direct oil into the mouth of Mill Creek for collection with a vac truck on the west side of the creek. Strong currents, particularly during outgoing tides, may prevent effective collection.	Stage from the large gravel parking area on the west side of the creek and north side of the highway.	Vehicle access from Highway 4 to parking area on west side of creek. Boat access from Ramp at Willow Grove Park.	Downstream resources.
LCR-53.9	New strategy 3/03	Mill Creek Slough (WA) 46°-11.335'N 123°-10.560'W	Exclusion - Keep oil out of Mill Creek.	Any flow	200'	Deploy boom across the mouth of Mill Creek upstream of the bridge on Highway 4 to prevent oil from moving up the creek and to direct oil to the west side for collection.	Stage from the large gravel parking area on the west side of the creek and north side of the highway.	Vehicle access from Highway 4 to parking area on west side of creek. Boat access from Ramp at Willow Grove Park.	Creek habitat.
LCR-54.2	Field test 3/97, visit 6/03	Abernathy Creek (WA) 46°-11.484'N 123°-10.086'W	Exclusion - Prevent oil from entering creek.	Any flow	400'	Boom off mouth of creek. Minimize disturbance of shoreline and back-beach areas around creek mouth. Use established roads only for vehicle access.	Stage from County Line Park.	Strategy can be deployed from land, but may be easier from a boat.	Sensitive shoreline and back-beach, Sept - May - most crucial to protect salmonid concentrations and habitat.
LCR-54.4	Field test 1/94	Gull/ Crims Islands - west opening (OR) 46°-11.050'N 123°-09.494'W	Exclusion - Protect backwaters behind Gull Island.	Low flow	500'	Deploy boom across the west opening between Gull Island and Crims Island.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-55.4	New strategy 3/03	John Slough (OR) 46°-10.164'N 123°-08.709'W	Exclusion - Prevent oil from entering slough.	Any flow	300'	Deploy boom across the entrance to the slough.	Stage from Kallunki Road at site.	Vehicle access from Kallunki Road near Locoda. May be easier to deploy from a boat.	Wetland habitat.
LCR-55.5	Field test 1/94	Gull/Crims Islands - east opening (OR) 46°-10.952'N 123°-08.475'W	Exclusion - Protect backwaters behind Gull Island.	Low flow	500'	Deploy boom across the east opening between Gull Island and Crims Island.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat.
LCR-55.6	Field test 1/94	Crims Island (OR) 46°-10.311'N 123°-08.464'W	Exclusion - Keep oil out of marsh area.	Any flow	300'	Place boom across opening to extensive marsh area on the south side of Crims Island.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat
LCR-55.7	Field test 3/97, visit 6/03	Germany Creek (WA) 46°-11.388'N 123°-07.536'W	Exclusion - Prevent oil from entering creek.	Any flow	200'	Deploy boom across the creek mouth.	Stage from the Willow Grove County Park.	Strategy can be deployed from land, but may be easier from a boat.	Sept - May - most crucial to protect salmonid concentrations and habitat.
LCR-55.9	Field test 3/97	Coal Creek Slough (WA) 46°-11.387'N 123°-06.932'W	Exclusion - Keep oil out of Coal Creek Slough.	Any flow	500'	Deploy boom across the mouth of Coal Creek Slough. Note - special attention needed for boom tending due to regular boat traffic in area.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat.
LCR-58.7	Field test 1/94	Fisher Island/Hump Island (WA) 46°-10.180'N 123°-04.515'W	Exclusion - Keep oil out of the slough between Fisher Island and Hump Island.	Any flow	1,000'	Deploy boom across the entrance to the slough between Fisher Island and Hump Island. Deploy at high tide only.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-58.8	Field test 1/94	Fisher Island Slough - west end (WA) 46°-10.335'N 123°-04.245'W	Deflection/ Collection - Prevent oil from moving into the slough from the west end.	Low flow	500'	Deploy boom from the north shore out to the anchor buoy whenever strong westerly wind could push oil upstream into the slough.	Stage from the Willow Grove County Park.	Vehicle access from Willow Grove Road. Boat access from the Ramp at Willow Grove Park.	Wetland/ backwater habitat.
LCR-58.9	Field test 1/94	Fisher Island - west end (WA) 46°-10.235'N 123°-04.278'W	Exclusion - Keep oil out of the marsh area.	Any flow	500'	Deploy boom in front of the marsh area on the west end of Fisher Island, particularly if there is a strong westerly wind.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat.
LCR-59.0	Field test 1/94	Fisher Island Slough - west end (WA) 46°-10.350'N 123°-04.090'W	Deflection/ Collection - Prevent oil from moving downstream.	Low flow	900'	Natural collection area - angle 3 parallel 300' sections of boom to deflect oil toward shore, where it can be collected with vac trucks/ skimmers.	Stage from the Willow Grove County Park.	Vehicle access from Willow Grove Road. Boat access from the Ramp at Willow Grove Park.	Protect downriver resources.
LCR-59.8	Modified strategy 3/03	Walker Island (OR) 46°-10.200'N 123°-03.966'W	Collection - Prevent oil from moving up channel behind island.	Low flow	500'	Deploy boom from the Oregon shore west of the down stream end of Walker Island to prevent oil from moving up behind the island when there is a strong westerly wind. Collect with a shallow water barge.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat.
LCR-60.2	Field test 1/94	Fisher Island - east end (WA) 46°-10.182'N 123°-02.895'W	Exclusion - Keep oil out of the marsh area.	Any flow	1000'	Deploy boom in front of marsh area to protect marsh from oil deflected into Fisher Island Slough.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Wetland habitat.
LCR-60.4	Field test 1/94	Fisher Island Slough - east end (WA) 46°-09.935'N 123°-02.710'W	Deflection/ Collection - Prevent oil from moving into slough.	Any flow	500'	Natural collection area - deploy boom from mainland shore to the anchor buoy in mid-channel to deflect oil toward shore, where it can be collected with vac trucks/ skimmers.	Stage from the Willow Grove County Park.	Vehicle access from Willow Grove Road. Boat access from the Ramp at Willow Grove Park.	Protect downriver and wetland resources.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-64.0	Field visit; date unknown	Lord Island - east end (OR) 46°-07.310'N 122°-59.890'W	Exclusion - Prevent oil from moving through the channel between Lord Island and Slaughters Dike.	Low flow	1,400'	Deploy boom across the opening between Lord Island and Slaughters Dike.	Stage from the Willow Grove County Park.	Boat access only. Ramp at Willow Grove Park.	Waterfowl use area, wetland habitat.
LCR-66.2	Field visit; date unknown	Port of Longview (WA) 46°-06.435'N 122°-57.378'W	Collection - Prevent oil from moving down stream.	Low flow	3,000'	Deploy 1,000' lengths of boom from the Port of Longview to contain/collect oil under docks. May need tug to assist in deployment. This is a major natural collection site, and the last good chance to prevent oil from moving down stream. <i>Note - Longview Fibre has developed a number of additional strategies in this vicinity to address the unique hazards of a toluene spill; consult their response plan for more information.</i>	Port of Longview.	Vehicle access from Longview to the port docks. Boat access from the Ramp at Willow Grove Park or Rainier.	Downstream resources.
LCR-70.0	Field visit; date unknown	Cottonwood Island - east side slough (WA) 46°-04.915'N 122°-52.540'W	Exclusion - Keep oil out of slough.	Any flow	500'	Close off mouth to the slough on east side of Cottonwood Island.	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.
LCR-71.4	No field visit/ test	Carrol's Channel south end (WA) 46°-03.510'N 122°-52.040'W	Exclusion - Keep oil out of small inlet at the south end of the channel (east side).	Any flow	1000'	Close off mouth of the small inlet at the south end of Carrol's Channel (on the east side).	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-71.5	New strategy 3/03	Carrol's Channel south end (WA) 46°-03.365'N 122°-52.333'W	Collection/ Exclusion - Natural collection area, prevent oil from moving up the channel.	Any flow	1200'	Deploy boom across the south end of Carrol's Channel to direct collected oil to the east shore, and to prevent oil from moving through Carrol's Channel. Current may be too strong to deploy boom across channel. If so, deploy as much boom as possible to divert oil to the east shore for collection.	Stage from the Willow Grove County Park or Kalama.	Vehicle access from east shore. Boat access from ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.
LCR-71.6	New strategy 3/03	Carrol's Channel south end (WA) 46°-03.345'N 122°-52.540'W	Collection - Enhance natural collection into south end of Carrol's Channel.	Low flow	500'	Deploy boom from the south end of Cottonwood Island to enhance natural collection.	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat.
LCR-73.7	No field visit/ test	Goble Creek (OR) 46°-01.250'N 122°-52.522'W	Exclusion - Keep oil out of the creek.	Any flow	100'	Deploy boom across creek mouth.	Stage from the Willow Grove County Park or Kalama.	Possible vehicle access from Highway 30. Boat access from ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Salmonid concentrations and habitat (peak times are Sep-Oct, Apr-May).
LCR-76.0	No field visit/ test	Tide Creek (OR) 45°-59.660'N 122°-51.920'W	Exclusion - Keep oil out of the slough and creek.	Any flow	1000'	Deploy boom across small slough at the creek mouth.	Stage from the Willow Grove County Park or Kalama.	Boat access only. Use ramp at Willow Grove Park, or steep pay boat ramp at Kalama.	Wetland habitat, salmonid concentrations and habitat (peak times are Sep-Oct, Apr-May).
LCR-79.5	No field visit/test	Martin Island - north end (WA) 45°-57.375'N 122°-47.985'W	Exclusion - Keep oil out of Martin Slough.	Any flow	600'	Deploy boom across the north end of Martin Slough.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-79.8	New strategy 3/03	Goat Island - north end (OR) 45°-56.945'N 122°-49.168'W	Exclusion - Keep oil out of slough behind Goat Island.	Any flow	600'	Deploy boom across the north end of the slough behind Goat Island.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-81.0	No field visit/test	Martin Island - south end (WA) 45°-56.065'N 122°-47.850'W	Exclusion - Keep oil out of Martin Slough.	Any flow	600'	Deploy boom across the south end of Martin Slough.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-81.2	No field visit/test	Burke Island - south end (WA) 45°-55.863'N 122°-47.823'W	Exclusion - Keep oil out of Burke Slough.	Any flow	300'	Deploy boom across the south end of Burke Slough.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-81.8	New strategy 3/03	Goat Island - south end (OR) 45°-55.518'N 122°-48.865'W	Exclusion - Keep oil out of slough behind Goat Island.	Any flow	500'	Deploy boom across the south end of the slough behind Goat Island.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Waterfowl (winter); geese (summer).
LCR-82.4	No field visit/test	Deer Island Slough (OR) 45°-54.860'N 122°-48.965'W	Exclusion - Keep oil out of slough.	Any flow	300'	Deploy boom across the mouth of the slough on the south end. Ensure tide gates are closed at each end.	Stage from St. Helens or Kalama.	Boat access only. Use ramp at St Helens, or steep pay boat ramp at Kalama.	Creek; freshwater clams; wetland habitat.
LCR-85.7	No field visit/test	Goerig Slough - collection (WA) 45°-52.400'N 122°-46.725'W	Collection - Prevent oil from moving down stream.	Low flow	1000'	Deploy boom from the southeast corner of the islands off Goerig Slough to the mainland shore for collection with a skimmer or vac truck.	Stage from St. Helens.	Possible vehicle access from Dike Road. Boat access from ramp at St Helens.	Downstream resources.
LCR-85.8	No field visit/test	Goerig Slough - diversion (WA) 45°-52.200'N 122°-46.905'W	Diversion - Prevent oil from moving down stream.	Low flow	700'	Deploy boom at an angle from the southwest corner of the islands off Goerig Slough, up-stream into the main channel of the river to divert oil into the area behind the islands for collection.	Stage from St. Helens.	Boat access only. Use ramp at St Helens.	Downstream resources.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-87.3	New strategy 3/03	Gee Creek (WA) 45°-50.895'N 122°-46.560'W	Exclusion - Keep oil out of the creek and slough up-stream.	Any flow	100'	Deploy boom across the mouth of the creek. Will likely require a shallow-draft boat.	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Wetlands habitat.
LCR-87.6	Field test 4/97	Ridgefield NWR/ Bachelor Island Slough - north entrance (WA) 45°-50.540'N 122°-46.685'W	Exclusion - Keep oil out of slough	Any flow	600'	Deploy boom across the down-river (north) end of Bachelor Island Slough. Note - oil may collect here naturally. Minimize disturbance of shoreline and back-beach areas. Use established roads only for vehicle access.	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Waterfowl, sand hill crane wintering, great blue heron spring nesting, bald eagle nests, wetlands habitat. Sensitive shoreline and back-beach.
LCR-91.0	Field test 4/97	Ridgefield NWR/ Bachelor Island Slough - south entrance (WA) 45°-47.625'N 122°-46.385'W	Exclusion - Keep oil out of slough	Any flow	600'	Deploy boom across the up-river (south) end of Bachelor Island Slough. Note - oil may collect here naturally. <i>Contact the USFWS to have 3 input pumps shut off - pager, 360-971-6000.</i>	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Waterfowl, sand hill crane wintering, great blue heron spring nesting, bald eagle nests, wetlands habitat. Sensitive shoreline and back-beach.
LCR-92.3	Field test 4/97	Campbell Lake (WA) 45°-46.972'N 122°-46.083'W	Exclusion - Keep oil out of the lake.	High flow	300'	Deploy boom across the entrance to Campbell Lake.	Stage from the Ridgefield Marina or St. Helens.	Boat access only. Use ramp at the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Sandhill crane roost area, waterfowl, wetlands habitat.



4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-94.3	Field visit 6/03	Post Office Lake (WA) 45°-45.275'N 122°-45.303'W	Exclusion - Keep oil out of slough adjacent to lake.	High flow	200'	Deploy boom in a chevron configuration to enclose the entrance to the culvert that connects the river to the lake. The culvert entrance on the river side is a grated concrete structure about 20-30 feet from shore that is nearly flush with the river bottom. <i>The entrance on the lake side has stop-logs, contact the USFWS at 360-971-6000 (pager) to have someone install the stop-logs.</i>	Stage from the boat ramp at Caterpillar Island, the Ridgefield Marina or St. Helens.	Vehicle access from the Lower River Road. Boat access from the ramp at Caperpillar Island, the Ridgefield Marina or St Helens.	Ridgefield National Wildlife Refuge. Waterfowl, wetlands habitat.
LCR-94.5	No field visit/test	Willow Bar Islands (OR) 45°-45.140'N 122°-46.060'W	Exclusion or Collection - Keep oil out of slough behind Willow Bar Islands or use for collection.	Any flow	800'	Deploy boom in a chevron configuration by placing one section from the north tip of the primary Willow Bar Island to the small island to the north, and then continuing northwest to Sauvie Island. If no waterfowl are present in the slough, deploy 600' of boom to divert oil into the north end of the slough for collection; deploy 200' of boom across the slough to prevent oil from moving into the south end of the slough.	Stage from the boat ramp at Caterpillar Island, the Ridgefield Marina or St. Helens.	Vehicle access from Brown Road on Sauvie Island. Boat access from the ramp at Caperpillar Island, the Ridgefield Marina or St Helens.	Wetland habitat.
LCR-97.5	Field test 11/97	Caterpillar Island - north end (WA) 45°-42.565'N 122°-45.555'W	Exclusion - Keep oil out of slough behind island.	High flow	500'	Deploy boom from the north tip of Caterpillar Island to the mainland shore.	Stage from the boat ramp at Caterpillar Island.	Boat access only from ramps at Caperpillar Island, Vancouver, or Portland.	Wetland habitat.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-98.6	Field test 11/97	Caterpillar Island - south end (WA) 45°-41.660'N 122°-45.815'W	Exclusion - Keep oil out of slough behind island.	High flow	500'	Deploy boom from the south tip of Caterpillar Island to the mainland shore.	Stage from the boat ramp at Caterpillar Island.	Boat access only from ramps at Caperpillar Island, Vancouver, or Portland.	Wetland habitat.
LCR-100.8	Field test 10/01	Vancouver Lake/ Flushing Channel (WA) 45°-39.947'N 122°-45.528'W	Deflection/ Collection - Deflect oil into Flushing Channel for collection.	Low flow	800'	Angle a 400' section SW into the river to deflect oil into a collection site in channel. Double boom channel with two 200' sections to protect Vancouver Lake. If necessary, valves can be closed at River Road to prevent oil from entering Vancouver Lake. This strategy is most effective with a south wind at slack water or when oil is moving along the north (east) shore. Sand bars at the mouth of the channel are dynamic and may require modification of the strategy.	Stage from Vancouver, Portland, or the parking area at the west end of the flushing channel.	Vehicle access from Lower River Road. Boat access from Vancouver or Portland.	Vancouver Lake; down river resources.
LCR-108.4	Field visit 9/94	Marine Park Boat Ramp - upriver from Ryan Point (WA) 45°-36.747'N 122°-38.022'W	Collection - Collect oil in small cove.	Low flow	500'	Angle boom off boat ramp into river; divert oil to collection site.	Stage from Vancouver, Portland, or the boat ramp parking area.	Marine Park Boat Ramp access via Marine Parkway; good command post area.	Down river resources.
LCR-109.6	Field visit 9/94	Wintler Park (WA) 45°-36.667'N 122°-36.652'W	Collection - Divert oil to collection sites.	Low flow	500'	Angle boom upstream, off point just down river of Wintler Park (note - may not need full 500').	Stage from Vancouver, Portland, or the boat ramp parking area.	Boat access from the ramp near Lieser Point. Vehicle access off of Highway 14.	Resources down river (may be osprey nests in the area).

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-111.0	Field visit 9/94	Upriver from Lieser Point (WA) 45°-36.345'N 122°-35.000'W	Collection - Divert oil to collection sites.	Low flow	400'	Angle (2) 200' sections upstream, at point up river of Lieser Point, and collect near ramp.	Stage from Vancouver, Portland, or the boat ramp parking area.	Boat access from the ramp near Lieser Point. Vehicle access off of Highway 14.	Resources down river (may be osprey nests in the area).
LCR-113.3	Field visit 9/97	Government Island I-205 bridge slough (OR) 45°-35.137'N 122°-32.525'W	Exclusion - Prevent oil from entering slough.	Low flow	600'	Place two 300' sections across slough entrances just east of I-205 bridge. Use pilings for anchor points. Note - natural eddy will bring oil inside.	Stage from Portland.	Boat access only from Vancouver or Portland.	Critical waterfowl area - high priority.
LCR-113.8	Field test 9/97	Steamboat Landing (WA) 45°-35.530'N 122°-31.675'W	Collection - Collect on upriver side of jetty.	Low flow	300'	Anchor boom to jetty, & angle into channel. Collect oil with barges. Culvert in jetty may need to be plugged.	Stage from Portland.	Boat access from Vancouver or Portland, or vehicles from SE Evergreen Highway.	Downstream resources.
LCR-114.8	Field visit 9/94	Jewit Lake intake (just downriver from Port of Portland Government Island dock) (OR) 45°-34.915'N 122°-30.517'W	Exclusion - Keep oil from entering Jewit Lake.	Any flow	100'	Boom off weir (water enters lake only at high water) - may be able to close weir valve.	Stage from Portland.	Boat access only from Vancouver or Portland - contact Oregon Dept. of Fish & Wildlife for weir gate control access.	Jewit Lake resources.
LCR-116.9	Field test 9/97	Sentry Gravel Pit (WA) 45°-34.845'N 122°-27.665'W	Collection - Prevent oil from moving down stream.	Low flow	400'	Deploy 2 lengths of 200' angled into the current to collect oil at the shoreline.	Stage from Portland.	Road down to water from Sentry Gravel Pit.	Downstream resources.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-119.1	Field test 8/00	Camas Slough - downstream (WA) 45°-34.385'N 122°-25.955'W	Deflection/ Collection - Keep oil in or out of the slough depending on source.	Low flow	800'	At low flow, it is possible to boom off Camas Slough. Angle the boom for collection on the south shore of the slough at a road to the water at the west end of the sewage pond on Lady Island. Angle the boom depending on if the source of the oil is from the river or the slough.	Stage from the Port of Camas, or the Fort James Camas mill.	Boat access from the Port of Camas. Vehicle access from Highway 14, contact Fort James Camas mill at 360-834-3021.	Walleye spawning.
LCR-119.8	Field test 8/00	Camas Slough - east of the Hwy-14 bridge (WA) 45°-34.782'N 122°-25.028'W	Collection - Prevent oil from moving down stream.	Any flow	800'	Deploy boom from the north side of the slough at the Fort James Camas wood mill at a SE angle across the slough. Collect with vac trucks from the north shore.	Stage from the Port of Camas, or the Fort James Camas mill.	Boat access from the Port of Camas. Vehicle access from Highway 14, contact Fort James Camas mill at 360-834-3021.	Downstream resources.
LCR-120.4	No field visit/ test	Camas Slough - upstream (WA) 45°-34.850'N 122°-24.377'W	Deflection/ Collection - Keep oil in or out of the slough depending on source.	Low flow	800'	During low flows it is possible to boom off the east end of Camas slough.	Stage from the Port of Camas, or the Fort James Camas mill.	Boat access from the Port of Camas. Vehicle access from Highway 14, contact Fort James Camas mill at 360-834-3021.	Washougal River salmonid stocks; walleye spawning.
LCR-120.6	No field visit/ test	Mouth of Washougal River (WA) 45°-34.625'N 122°-24.153'W	Exclusion - Keep oil out of the Washougal River and Camas Slough.		400'	Deploy boom at the bridge to Lady Island.	Stage from the Port of Camas, or the Fort James Camas mill.	Boat access from the Port of Camas.	Washougal River salmonid stocks.
LCR-120.7	No field visit/ test	Sandy River - west side of mouth (OR) 45°-34.022'N 122°-23.550'W	Deflection - Keep oil out of river mouth.	Any flow	500'	Deploy boom from the northeast corner of the west entrance to the Sandy River at an angle to deflect oil moving down the Columbia River back into the main channel.	Stage from the Port of Camas.	Boat access from the Port of Camas.	Salmonid concentrations and habitat, smelt.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-122.6	No field visit/ test	Sandy River - east side of mouth (OR) 45°-33.680'N 122°-21.860'W	Deflection/ Exclusion - Keep oil out of river mouth.	High flow	900'	Boom off entrances on the east side of the river mouth. The position and number of the entrances is variable due to shifting delta sediments and also depends on river flow.	Stage from the Port of Camas.	Boat access from the Port of Camas.	Salmonid concentrations and habitat, smelt.
LCR-137.0	No field visit/ test	Franz Lake (WA) 45°-36.013'N 122°-06.345'W	Exclusion - Keep oil out of lake.		200'	Deploy boom across the entrance to the lake.	Stage from the Beacon Rock State Park, Skamania Landing, or the Port of Camas.	Boat access from a ramp at the Beacon Rock State Park or Skamania Landing.	National wildlife refuge; wildlife and waterfowl concentrations in winter, juvenile salmon rearing area, bald eagle nesting.
LCR-138.0	No field visit/ test	Horsetail / Oneonta Creeks (OR) 45°-35.520'N 122°-04.522'W	Exclusion - Keep oil out of creeks.	Any flow	100'	Deploy boom across the mouth of the creeks.	Stage from the Beacon Rock State Park, Skamania Landing, or the Port of Camas.	Boat access from a ramp at the Beacon Rock State Park or Skamania Landing.	Sensitive nesting; salmonid concentrations and habitat (peak times are May - June, Oct - Dec).
LCR-141.4	New strategy 3/03	Hardy Slough/ Creek (WA) 45°-37.573'N 122°-00.985'W	Exclusion - Keep oil out of the slough/ creek.	Any flow	400'	Deploy boom across the mouth of the creek.	Stage from the Beacon Rock State Park.	Boat access from a ramp at the Beacon Rock State Park.	National wildlife refuge; major chum salmon spawning area, juvenile salmon rearing area.
LCR-142.4	No field visit/ test	Channel between Ives and Pierce Islands (WA) 45°-37.270'N 121°-59.885'W	Deflection/ Exclusion - Keep oil in the main channel and out of north channel.		700'	Deploy boom between Pierce and Ives Islands at the narrowest point (if not feasible, not a priority).	Stage from the Beacon Rock State Park.	Boat access from a ramp at the Beacon Rock State Park.	Salmonid concentrations and habitat, mixed sport fishery, sturgeon spawning, waterfowl.

**4.3.2.1 Lower Columbia River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
LCR-142.8	No field visit/ test	Greenleaf Slough (WA) 45°-37.658'N 121°-59.665'W	Exclusion - Prevent oil from entering slough.	Any flow	400'	Boom off entrance to Hamilton Creek. Minimize disturbance of shoreline and back-beach areas around creek mouth. Use established roads only for vehicle access.	Stage from the Beacon Rock State Park.	Boat access from a ramp at the Beacon Rock State Park.	Important nesting area; endangered plant species ( <i>Rorippa</i> ) along the northern shoreline. Sensitive shoreline and back-beach.
LCR-143.1	No field visit/ test	Channel between Ives and Hamilton Islands (WA) 45°-37.565'N 121°-59.155'W	Deflection/ Exclusion - Keep oil in the main channel and out of north channel.		800'	Deploy boom between Ives and Hamilton Islands at the narrowest point (if not feasible, not a priority). Minimize disturbance of shoreline and back-beach areas. Use established roads only for vehicle access.	Stage from the Beacon Rock State Park.	Boat access from a ramp at the Beacon Rock State Park.	Salmonid concentrations and habitat, mixed sport fishery, sturgeon spawning, waterfowl. Sensitive shoreline and back-beach.

## 4.3.2.2 Multnomah Channel Proposed Booming and Collection Strategies: Matrices

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
MC-1	Field test 11/97	Multnomah Channel - southern entrance, south shore 45°-37.120'N 122°-47.850'W	Deflection/ Collection - Prevent oil from moving up the channel.	Any flow	2,800'	Deploy 400' at south side of Multnomah Channel mouth, extending NE to pilings; deploy another parallel 400' slightly downstream. Deploy 2,000' toward NE, running from same pilings on south shore to dolphin on north shore to deflect oil toward MC-2. Note - during lower flow, can instead create collection chevron by angling 2,000' from mid-channel back to dolphin at north end of mouth.	Portland.		Waterfowl, eagle winter feeding area, shorebirds, cranes, Sturgeon Lake, sensitive marshes.
MC-2	Field test 11/97	Multnomah Channel - southern entrance, north shore 45°-37.340'N 122°-48.300'W	Collection - Prevent oil from moving up the channel.	Low flow	900'	Run 700' section from north shore to boom anchor buoy to collect oil deflected by MC-1; extend additional 200' into channel from buoy. Angle second 400' section parallel and slightly downstream for back-up.	Portland.	Via Fred's Marina off Highway 30. Access to Sauvie Island from Highway 30 to S. Island Rd.	Waterfowl, eagle wintering area, shorebirds, cranes, Sturgeon Lake, sensitive marshes.
MC-3a	Field test 2/97	Multnomah Channel - Sauvie Island bridge, west side 45°-37.705'N 122°-49.025'W	Collection - Prevent oil from moving up the channel.	Any flow	400'	Angle boom from the mainland to the bridge. Collect oil with portable skimmers.	Portland.	Via Fred's Marina off Highway 30. Access to Sauvie Island from Highway 30 to S. Island Rd.	Waterfowl, eagle winter feeding area, shorebirds, cranes, Sturgeon Lake, sensitive marshes.
MC-3b	Field test 2/97	Multnomah Channel - Sauvie Island bridge, east side 45°-37.765'N 122°-48.925'W	Collection - Prevent oil from moving up the channel.	Any flow	600'	Angle boom from Sauvie Island to the bridge. Collect oil with portable skimmers.	Portland.	Via Fred's Marina off Highway 30. Access to Sauvie Island from Highway 30 to S. Island Rd.	Waterfowl, eagle winter feeding area, shorebirds, cranes, Sturgeon Lake, sensitive marshes.

**4.3.2.3 Willamette River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WR-0.9	Field test 6/97	Columbia Slough (Smith & Bybee Lakes) 45°-38.608'N 122°-46.043'W	Deflection/ Collection - Deflect oil into collection area in slough; keep oil out of inner slough and lakes.	Any flow	1000'	Use 400' section to deflect oil into the entrance to Columbia Slough - place boom on N or S side of entrance depending on spill location and tide. Double boom the inside of entrance with 300' sections to prevent oil from moving into the inner slough and lakes.	Portland.	Via boat.	Critical wetland area.
WR-3.7	No field visit/ test	Willamette River 45°-36.720'N 122°-46.938'W	Collection - Prevent oil from moving into the Columbia River.	Any flow	500'	Angle boom from east shore to deflect/ collect oil moving toward the Columbia River. Will need to anchor ends in river or tend with a workboat.	Cathedral Park.	Boat ramp at Cathedral Park.	Lower Columbia River resources.
WR-4.3	No field visit/ test	Willamette River 45°-36.283'N 122°-46.695'W	Collection - Prevent oil from moving into the Columbia River.	Any flow	500'	Angle boom from east shore to deflect/ collect oil moving toward the Columbia River. Will need to anchor ends in river or tend with a workboat.	Cathedral Park.	Boat ramp at Cathedral Park.	Lower Columbia River resources.
WR-4.4	No field visit/ test	Willamette River 45°-36.227'N 122°-46.651'W	Collection - Prevent oil from moving into the Columbia River.	Any flow	500'	Angle boom from east shore to deflect/ collect oil moving toward the Columbia River. Will need to anchor ends in river or tend with a workboat.	Cathedral Park.	Boat ramp at Cathedral Park.	Lower Columbia River resources.
WR-4.5	No field visit/ test	Willamette River 45°-36.098'N 122°-46.562'W	Collection - Prevent oil from moving into the Columbia River.	Any flow	500'	Angle boom from east shore to deflect/ collect oil moving toward the Columbia River. Will need to anchor ends in river or tend with a workboat.	Cathedral Park.	Boat ramp at Cathedral Park.	Lower Columbia River resources.
WR-5.8	No field visit/ test	Willamette River - St. John's Bridge 45°-35.220'N 122°-45.725'W	Collection - Prevent oil from moving into the Columbia River.	Any flow	300'	Deploy boom from Cathedral Park to the St. John's Bridge to contain/ collect oil at the park.	Cathedral Park.	Boat ramp at Cathedral Park.	Lower Columbia River resources.



**4.3.2.3 Willamette River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WR-6.9a	No field visit/ test	BNRR Bridge 45°-34.723'N 122°-44.668'W	Collection - Prevent oil from moving downriver.	Any flow	500'	Deploy boom at north end to deflect into shore; collection by portable skimmers.	Cathedral Park.	By boat from Cathedral Park. Road access limited; private property involved.	Downriver resources.
WR-6.9b	No field visit/ test	BNRR Bridge 45°-34.566'N 122°-44.900'W	Collection - Prevent oil from moving downriver.	Any flow	500'	Deploy boom at south end to deflect into shore; collection by portable skimmers.	Cathedral Park.	By boat from Cathedral Park. Road access limited; private property involved.	Downriver resources.
WR-7.5	Field test date unknown	West side below oil facilities 45°-34.177'N 122°-44.355'W	Collection - Prevent oil from moving downriver.	Low/ medium	500'	Deploy boom from the west shore down stream of the oil facilities to collect and direct oil toward the beach.	Cathedral Park.	Elf Atochem dock downriver (no road access to proposed anchor point). Contact 503-225-7210.	Downriver resources.
WR-13.4	No field visit/ test	River Place Marina 45°-30.565'N 122°-40.235'W	Deflection - Keep oil out of net pens.	Any flow	800'	Deploy boom to deflect the oil into the main channel.	Stevens Point.	By boat from the River Place Marina.	Fish net pens.
WR-13.5	No field visit/ test	OMSI 45°-30.492'N 122°-39.928'W	Deflection - Keep oil off shoreline.	Any flow	500'	Deploy boom to deflect the oil into the main channel away from the shoreline.	Stevens Point.	By boat from the River Place Marina.	Fish net pens, OMSI docks.
WR-14.1	No field visit/ test	Zidell 45°-30.005'N 122°-39.983'W	Collection - Prevent oil from moving downriver.	Any flow	500'	Deflect oil toward beach for collection.	Stevens Point.	Zidell yard.	Downriver resources.

**4.3.2.3 Willamette River Proposed Booming and Collection Strategies: Matrices**

Strategy	Status	Location	Response Strategy	Flow Level	Length of Boom	Strategy Implementation	Staging Area	Site Access	Resources Protected
WR-14.7	Field visit 7/97	Ross Island east channel - Hardtack Island 45°-29.410'N 122°-39.410'W	Collection - Prevent oil from moving downriver.	High	1,200'	Deploy boom from the lower (north) end of Hardtack Island to a vac truck on the east bank.	Ross Island parking lot.	Ross Island Sand & Gravel has boat ramp/ house on property at 4315 S.E. McLoughlin Blvd. (503) 239-5504.	Downriver resources; osprey nest.
WR-14.9	No field visit/ test	Ross Island west channel - west bank 45°-29.323'N 122°-40.218'W	Collection - Prevent oil from moving downriver.	Medium/ High	500'	Deflect oil toward west shore for collection.	Stevens Point.		Downriver resources.
WR-15.5	No field visit/ test	Ross/ Hardtack Island - SW corner 45°-28.870'N 122°-39.873'W	Collection - Prevent oil from moving downriver.	Medium/ High	800'	Natural collection area - divert oil to skimmer for collection.	Stevens Point.	By boat.	Downriver resources.
WR-15.9	No field visit/ test	Oaks Bottom 45°-28.670'N 122°-39.365'W	Exclusion - Prevent oil from entering pond.	Any flow	100'	Deploy boom to block culverts.			Waterfowl feeding area.
WR-18.4	No field visit/ test	Johnson Creek 45°-26.700'N 122°-38.550'W	Exclusion (or collection at low flow for upstream source).	Low/ medium	200'	Close off mouth to creek - may not be possible (or necessary) at high flow.	Milwaukie boat ramp.	Highway 99E.	Winter steelhead; fall chinook; part of Salmon Trout Enhancement Program.
WR-18.5	No field visit/ test	Kellogg Lake 45°-26.525'N 122°-38.478'W	Exclusion - Prevent oil from entering lake.	Any flow	100'	Close off entrance.	Milwaukie boat ramp.	Highway 99E.	Winter steelhead; coho salmon.

**4.3.2.3 Willamette River Proposed Booming and Collection Strategies: Matrices**

<b>Strategy</b>	<b>Status</b>	<b>Location</b>	<b>Response Strategy</b>	<b>Flow Level</b>	<b>Length of Boom</b>	<b>Strategy Implementation</b>	<b>Staging Area</b>	<b>Site Access</b>	<b>Resources Protected</b>
WR-21.1	No field visit/ test	Oswego Creek 45°-24.625'N 122°-39.580'W	Exclusion - Prevent oil from entering creek.	Any flow	N/A	Shut locks. Fast moving creek.		City of Lake Oswego.	Waterfowl; turtles. Possible water intake.
WR-21.2	No field visit/ test	George Waters Park 45°-24.570'N 122°-39.455'W	Collection - Prevent oil from moving downriver.	Any	300'	Angle 300' boom into current and collect at boat ramp with vac trucks, skimmers. Natural collection area.	George Waters Park.	Boat ramp - located south of Oswego Creek.	Downstream resources.
WR-23.1	No field visit/ test	Cedar Island - north end 45°-23.435'N 122°-37.635'W	Exclusion - Keep oil out of the west channel behind Cedar island.	Low/ medium	300'	Deploy boom across the channel at the north end of the island. Site may be underwater at high flow.	Boat ramp at lower end of island.		Osprey; turtles.
WR-23.6	No field visit/ test	Cedar Island - south end 45°-23.110'N 122°-37.425'W	Exclusion - Keep oil out of the west channel behind Cedar island.	Low/ medium	500'	Deploy boom across the channel at the south end of the island. Site may be underwater at high flow.	Boat ramp at lower end of island.		Osprey; turtles.
WR-23.8	No field visit/ test	Unnamed Slough west of Meldrum Slough 45°-22.885'N 122°-37.305'W	Exclusion - Keep oil out of the slough.	Low/ medium	200'	Deploy boom across the entrance to the unnamed slough on west side of the river. Current is too fast for collection.	Clackamas Park.	Via boat.	Waterfowl, wetland habitat.
WR-23.9	No field visit/ test	Meldrum Slough 45°-22.860'N 122°-37.120'W	Exclusion - Keep oil out of the slough.	Low/ medium	200'	Deploy boom across the entrance to Meldrum Slough. Current is too fast for collection.	Clackamas Park.	Via boat.	Waterfowl, wetland habitat.
WR-25.0	No field visit/ test	Clackamas River Lagoon 45°-22.420'N 122°-35.900'W	Exclusion - Keep oil out of the lagoon.	Any flow	200'	Close off entrance to protect state net pens; oil unlikely to enter but may affect water intake.	Lonestar.		OR Dept. of Fish & Wildlife salmon net pens.

**4.3.2.3 Willamette River Proposed Booming and Collection Strategies: Matrices**

<b>Strategy</b>	<b>Status</b>	<b>Location</b>	<b>Response Strategy</b>	<b>Flow Level</b>	<b>Length of Boom</b>	<b>Strategy Implementation</b>	<b>Staging Area</b>	<b>Site Access</b>	<b>Resources Protected</b>
WR-25.4	Field visit 1/97	Oregon City boat ramp 45°-21.900'N 122°-36.060'W	Collection - Prevent oil from moving downriver.	Any flow	500'	Deploy parallel 300' and 200' lengths of boom to collect oil on the east shore at the boat ramp. Natural collection area - lots of debris = safety hazards.	Boat ramp.	Boat ramp - heavy public use may restrict access.	Downriver resources.
WR-26.1	Field test date unknown	Willamette Falls Locks 45°-21.460'N 122°-36.690'W	Containment - Prevent oil from moving downriver.	Low/medium	500'	Close locks. Boom around Simpson tank farm. Back eddy during summer. Access may be underwater at high flows. Floating debris = safety concerns.	Sportcraft Marina.	Boat/walkway.	Downriver resources.

## 7. Logistical Information

**The following is not a complete list of logistical resources - for more information please refer to the Area Contingency Plan, Summary of Area Resources Chapter 6. The subject headings which have an asterisk (\*) are being developed; please consult local DEM officials (phone numbers listed in the ACP) for specific information.**

**To submit data for this section, please use Comments/ Corrections/ Suggestions (Appendix C).**

### 7.1 Logistical Support

The following list was compiled at the Lower Columbia River Geographic Response Plan Workshop held in Lower Columbia River on February 18, 1993. Areas of information include: command posts; communications; equipment cache locations; inventory of local support equipment; air support; access points to the Bay; and other pertinent logistical support.

Subject	Name	Characteristics	Contact	Phone #
<b>Command Posts</b>				
	Large Local Motels	Meeting rooms available	Chambers of Commerce	
	County Fairgrounds	Good option for wildlife rehab operation; good for upriver spills		
	Tongue Point	Excellent water access, staging, security	Job Corps	
	Port of Astoria	Small space available for forward command post	Port Offices	
	PGE Beaver Facility	Helicopter landing pad; empty storage tanks available for interim storage	Chuck Carlson	
	Port of Ilwaco	Good forward command post. Limited office, but good for trailers. Ramp; helo access		
	Camp Rilea	Enormous National Guard Facility, with storage, berthing, security, air traffic control, messing	Oregon National Guard	

Subject	Name	Characteristics	Contact	Phone #
	Frenchman's Bar Riverfront Park	6508 Lower River Rd. – Good field command post site with significant space for trailers	Clark County Parks	
<b>Communications</b>				
<b>See NWACP, Chapter 6</b>				
<b>Equipment Cache Locations</b>				
	Astoria	MSRC  Clean Rivers/MFSA  Foss	Barry Kevan-Everett ,WA  Brent Way  Tim Archer	(425) 304-1526 (503) 220-2040 (503) 978-7272
	Cathlamet	Clean Rivers/ MFSA	Brent Way	(503) 220-2040
	Skamakowa	Clean Rivers/ MFSA	Brent Way	(503) 220-2040
	Stella	Clean Rivers/ MFSA	Brent Way	(503) 220-2040
	Longview	Cowlitz Clean Sweep	Bob Matson	(503) 965-6165
	Wauna	Clean Rivers/ MFSA	Brent Way	(503) 220-2040
	Rainier	Clean Rivers/ MFSA  Foss	Brent Way  Tim Archer	(503) 228-4361 (503) 978-7272
	Portland	Clean Rivers/ MFSA  Foss  Tidewater	Brent Way  Tim Archer  Holly Robinson	(503) 220-2040 (503) 978-7272 (360) 693-1491
<b>Also see NWACP, Chapter 6</b>				
<b>Inventory of Local Support Equipment</b>				
<b>Helicopter Support/Air Support</b>				
<b>Access Points</b>				
	Aldrich Point	Concrete		
	Boardman Park	Concrete		
	Celilo Park	Asphalt		
	Coverts Landing	Concrete		
	Dalton Point	Asphalt		

Subject	Name	Characteristics	Contact	Phone #
	East Mooring Basin	Concrete		
	Giles French Park	Concrete		
	Fort Canby Park	Concrete		
	Hammond Mooring Basin	Asphalt		
	Harbor 1	Hoist		
	Hood River	Concrete		
	Irrigon Marina Park	Concrete		
	Jantzen Beach	Asphalt		
	James Gleason Ramp	Concrete		
	Mayer State Park	Concrete		
	Pier 99 Marine Center	Hoist		
	Port of Arlington	Concrete		
	Cascade Locks	Asphalt		
	Port of Dalles	Concrete		
	Quesnel Park	Concrete		
	Rainier Marina	Asphalt		
	Rooster Rock State Park	Asphalt		
	Goble Landing	Concrete		
	St. Helens Marina	Asphalt		
	Sundance Moorage	Hoist		
	Sundial	Asphalt		
	Tongue Point	Concrete		
	Umatilla Marina	Concrete		
	Westport Ramp	Concrete		
	Willow Grove Park	Concrete		
	(NOTE: Above list does not Willamette River Boat Ramps)			
<b>Property Access Information and Contacts</b>				
<b>Staging Areas</b>				
<b>Recreational activities which could interfere</b>				
<b>Tribal Resources</b>	Columbia River Inter-Tribal Fish Commission		Portland Office	(503) 238-0667
<b>Key Local Elected Officials</b>				
<b>Fire Department</b>				
<b>Local Personnel Support</b>				



Subject	Name	Characteristics	Contact	Phone #
<b>Volunteers</b>				
<b>Wildlife Rehab facilities</b>				
<b>Marinas/Port docks</b>				
<b>Housing/ feeding/ support</b>				
<b>Interim storage/permits</b>				
<b>Fishing fleets &amp; affiliated organizations*</b>				
<b>Boat cleaning capability*</b>				
<b>Safe havens</b>				

**APPENDICES****Appendix A: Summary of Protection Techniques**

<b>Protection Techniques</b>	<b>Description</b>	<b>Primary Logistical Requirements</b>	<b>Limitations</b>
<b>ONSHORE</b>			
<b>Beach Berms</b>	A berm is constructed along the top of the mid-inter tidal zone from sediments excavated along the downgradient side. The berm should be covered with plastic or geo-textile sheeting to minimize wave erosion.	<ul style="list-style-type: none"> <li>• Bulldozer/Motor grader -1</li> <li>• Personnel - equipment operator &amp; 1 worker</li> <li>• Misc. - plastic or geotextile sheeting</li> </ul>	<ul style="list-style-type: none"> <li>• High wave energy</li> <li>• Large tidal range</li> <li>• Strong along shore currents</li> </ul>
<b>Geotextiles</b>	A roll of geotextile, plastic sheeting, or other impermeable material is spread along the bottom of the supra-tidal zone & fastened to the underlying logs or stakes placed in the ground.	<ul style="list-style-type: none"> <li>• Geotextile - 3 m wide rolls</li> <li>• Personnel - 5</li> <li>• Misc. - stakes or tie-down cord</li> </ul>	<ul style="list-style-type: none"> <li>• Low sloped shoreline</li> <li>• High spring tides</li> <li>• Large storms</li> </ul>
<b>Sorbent Barriers</b>	A barrier is constructed by installing two parallel lines of stakes across a channel, fastening wire mesh to the stakes & filling the space between with loose sorbents.	Per 30 meters of barrier <ul style="list-style-type: none"> <li>• Wire mesh - 70 m x 2 m</li> <li>• Stakes - 20</li> <li>• Sorbents - 30 m<sup>2</sup></li> <li>• Personnel - 2</li> <li>• Misc. - fasteners, support lines, additional stakes, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Waves &gt; 25 cm</li> <li>• Currents &gt; 0.5 m/s</li> <li>• Tidal range &gt; 2 m</li> </ul>
<b>Inlet Dams</b>	A dam is constructed across the channel using local soil or beach sediments to exclude oil from entering channel.	<ul style="list-style-type: none"> <li>• Loader - 1</li> <li>• Personnel - equipment operator &amp; 1 worker or several workers w/shovels</li> </ul>	<ul style="list-style-type: none"> <li>• Waves &gt; 25 cm</li> <li>• Tidal range exceeding dam height</li> <li>• Freshwater outflow</li> </ul>

<b>NEARSHORE</b>			
<b>Containment Booming</b>	Boom is deployed in a "U" shape in front of the oncoming slick. The ends of the booms are anchored by work boats or drogues. The oil is contained within the "U" & prevented from reaching the shore.	For 150 meters Slick: <ul style="list-style-type: none"> <li>• Boom - 280 m</li> <li>• Boats - 2</li> <li>• Personnel - boat crews &amp; 4 boom tenders</li> <li>• Misc. - tow lines, drogues, connectors, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• High winds</li> <li>• Swells &gt; 2 m</li> <li>• Breaking waves &gt; 50 cm</li> <li>• Currents &gt; 1.0 m/s</li> </ul>
<b>Exclusion Booming</b>	Boom is deployed across or around sensitive areas & anchored in place. Approaching oil is deflected or contained by boom.	Per 300 meters of Boom <ul style="list-style-type: none"> <li>• Boats - 1</li> <li>• Personnel - boat crew &amp; 3 boom tenders</li> <li>• Misc.- 6 anchors, anchor line, buoys, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Currents &gt; 0.5 m/s</li> <li>• Breaking waves &gt; 50 cm</li> <li>• Water depth &gt; 20 m</li> </ul>
<b>Deflection Booming</b>	Boom is deployed from the shoreline away from the approaching slick & anchored or held in place with a work boat. Oil is deflected away from shoreline.	Single Boom, 0.75 m/s knot current <ul style="list-style-type: none"> <li>• Boom - 60 m</li> <li>• Boats - 1</li> <li>• Personnel - boat crew + 3</li> <li>• Misc. - 3 anchors, line, buoys, recovery unit</li> </ul>	<ul style="list-style-type: none"> <li>• Currents &gt; 1.0 m/s</li> <li>• Breaking waves &gt; 50 cm</li> </ul>
<b>Diversion Booming</b>	Boom is deployed from the shoreline at an angle towards the approaching slick & anchored or held in place with a work boat. Oil is diverted towards the shoreline for recovery.	Single Boom, 0.75 m/s knot current <ul style="list-style-type: none"> <li>• Boom - 60 m</li> <li>• boats - 1</li> <li>• Personnel - boat crew + 3</li> <li>• Misc. - 3 anchors, line, buoys, recovery unit</li> </ul>	<ul style="list-style-type: none"> <li>• Currents &gt; 1.0 m/s</li> <li>• Breaking waves &gt; 50 cm</li> </ul>
<b>Skimming</b>	Self-propelled skimmers work back & forth along the leading edge of a windrow to recover the oil. Booms may be deployed from the front of a skimmer in a "V" configuration to increase sweep width. Portable skimmers are placed within containment booms in the area of heaviest oil concentration.	Self-propelled (None) Towed <ul style="list-style-type: none"> <li>• Boom - 200 m</li> <li>• Boats - 2</li> <li>• Personnel - boat crews &amp; 4 boom tenders</li> <li>• Misc. - tow lines, bridles, connectors, etc.</li> </ul> Portable <ul style="list-style-type: none"> <li>• Hoses - 30 m discharge</li> <li>• Oil storage - 2000 liters</li> </ul>	<ul style="list-style-type: none"> <li>• High winds</li> <li>• Swells &gt; 2 m</li> <li>• Breaking waves &gt; 50 cm</li> <li>• Currents &gt; 1.0 m/s</li> </ul>

**Appendix B: Original Geographic Response Plan Contributors****Industry and Response Contractors**

Tim Archer, Foss Environmental  
Heather Bartlett, Simpson Paper Company  
Gary Braun, Tetra Tech Inc.  
Jeff Brooks, Riedel Environmental Services  
Mark Copeland, Clean Rivers Coop  
Kendal Couch, Marine Spill Response Corp.  
Dean Dale, Genwest Systems, Inc.  
Donald Floyd, Fred Devine Diving & Salvage  
Paul Gallagher, Foss Environmental  
Don Hall, Pac Link  
Rick Harshfield, Marine Spill Response Corp.  
Dick Heymann, Riedel Environmental Services  
Dean Lackey, Fred Devine Diving & Salvage  
Ted Leigh, Marine Spill Response Corp.  
Mike Lordos, Riedel Environmental Services  
Bob Mattson, Cowlitz Clean Sweep  
John Peterson, Riedel Environmental Services  
Chris Sherwood, Battelle Marine Sciences Lab  
Evert Smith, Brix Maritime  
Paul Stevenson, Columbia River Pilots  
Lisa Stone, Marine Spill Response Corp.  
Brent Way, Clean Rivers Coop  
Harold Zarling  
Jack Zimmerman

**Local Representatives**

Dave Glasson, City of Long Beach  
Jon Graves, CREST  
Carol Rushmore, CREST  
Darlena Wilson, Pacific Co. Emer. Management

**State Representatives - Washington****Washington State Department of Ecology**

Jeff Bash  
Don Beery  
Lin Bernhardt  
Jeannie Brandt  
Laura Geselbracht  
Shari Harris-Dunning  
Paul Heimowitz  
Eric Heinitz  
Steve Hunter  
Dick Logan  
Brett Manning  
Jim Oberlander  
Dave Rogowski

**State Representatives – Washington cont.****Washington Department of Fish & Wildlife**

Rocky Beach  
Brian Benson  
Bill Graeber  
Thom Hooper  
Steve Jeffries  
Jeff Skriletz  
Barry Troutman

**Washington Office of Marine Safety**

Joel Greene

**Washington Parks & Recreation Commission**

Mike Barber  
Larry Chapman  
Mike Ramsey

**Washington State Patrol**

Lonnie Brackins  
Robert Johnson

**State Representatives - Oregon****Oregon Economic Development Department**

Don Mann

**Oregon Department of Environmental Quality**

Rebecca DeMoss  
Elizabeth Dimmick  
Cordelia Shea  
Bruce Sutherland  
Jack Wylie  
Loren Garner

**Oregon Department of Fish & Wildlife**

Don Bennett  
Joe Pesek  
Terry Link  
Greg Robart  
Allen Taylor  
Don Vandenberg

**Oregon State Parks**

Peter Bond

**Federal Representatives**

**United States Coast Guard**

Christina Bjergo  
Mark Corcoran  
James Crawford  
Chris Curatilo  
Glenn Epler  
Rod Leland  
Rob Myles  
Daniel Neptun  
Janice Page  
Greg Schultz  
Paul Slyman

**National Oceanic and Atmospheric  
Administration**

Ken Barton  
Sharon Christopherson  
Jerry Galt  
Doug Helton  
Gary May

**U.S. Department of Interior**

Charles Polityka  
Preston Sleeper

**U.S. Fish and Wildlife Service**

Colleen Henson  
Al Clark  
Elizabeth Materna  
Carol Schuler

**National Park Service**

Curt Ahola  
Cynthia Orlando

## Appendix C: Geographic Response Plan Comments/Corrections/Suggestions

If you have any questions regarding this document or find any errors, please notify one of the following agencies: or use tear out sheet (page C-3)

- Washington Department of Ecology, SPPR program, Natural Resources Unit
- USCG Marine Safety Office Puget Sound, Planning Department
- USCG Marine Safety Office Portland
- Oregon Department of Environmental Quality
- Idaho Emergency Response Commission
- Environmental Protection Agency Region 10

### Phone Numbers:

Washington DOE	(360) 407-6972
USCG MSO Puget Sound	(206) 217-6213
USCG MSO Portland	(503) 240-9307
Oregon DEQ	(503) 229-5774
Idaho ERC	(208) 334-3263
EPA	(206) 553-6901

### Bulletin Board System (BBS):

USCG MSO Puget Sound	(206) 217-6216
USCG MSO Portland	(503) 240-9308

### Internet/E-mail Address:

WADOE	Dale Davis, dald461@ecy.wa.gov
OR DEQ	Jack Wylie, WYLIE.Jack@deq.state.or.us
USCG MSO Puget Sound	LT Tedd Hutley, thutley@pacnorwest.uscg.mil
USCG MSO Portland	LT Rob Walls, rwalls@pacnorwest.uscg.mil
USEPA	Beth Sheldrake, sheldrake.beth@epamail.epa.gov

### Address:

Commanding Officer United States Coast Guard MSO Puget Sound Planning Department 1519 Alaskan Way South Seattle, WA 98134-1192	Washington Department Of Ecology SPPR Program Natural Resources Unit P.O. Box 47600 Olympia, WA 98504-7600	Office Of The Governor Idaho Emergency Response Commission 1109 Main Statehouse Boise, ID 83720-7000
Commanding Officer United States Coast Guard Planning Department MSO Portland 6767 North Basin Ave Portland, OR 97217-3992	Oregon Department of Environmental Quality Water Quality Division 811 SW Sixth Avenue Portland, OR 97204	Environmental Protection Agency Emergency Response Branch 1200 Sixth Avenue Seattle, WA 98101

*Geographic Response Plan***Comments/Corrections/Suggestions****Directions:**

Fill in your name, address, agency, and phone number. Fill in the blanks regarding the location of information in the plan being commented on. Make comments in the space provided. Add extra sheets as necessary. Submit to: Dale Davis

Department of Ecology  
300 Desmond Drive  
P.O. Box 47600  
Olympia, WA 98504-7600  
dald461@ecy.wa.gov

Name: _____	Title: _____	Agency: _____
Address: _____		
City: _____	State/Province: _____	Zip/Postal Code: _____
Phone: (____) _____	E-Mail: _____	

GRP: _____	Page Number: _____
Location on page (chapter, section, paragraph) (e.g. 2.1, paragraph 3): _____	

Comments: _____



---

---

Northwest Area Committee  
c/o Washington Department of  
Ecology  
Spills Program  
Natural Resources Unit - GRP  
Corrections  
P.O. Box 47600  
Olympia, WA 98504-7600